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OBSERVATIONS ON THE FUNCTIONAL EXAMINATION OF THE NORMAL EAR.

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Translated by Dr. E. B. DENCH, of New York.

THE following paper was suggested by the investigations of Schwabach on the absolute exaggeration of bone-conduction in certain forms of middle-ear affections and of its diminution in labyrinthine disease, by the determination of the upper true limit by Burckhardt-Merian, and also by the statistical results of Bezold as to the diagnostic value of Rinne's experiment. This last observer considered more especially the physiological side of the question, and by his experiments upon the normal ear established firmly the progressive changes in bone-conduction and the loss of perception of low tones which occur in certain pathological conditions.

As these experiments are evidently of fundamental importance, I decided to verify most of them experimentally by the examination of the middle ear in a large number of cases.

In these experiments I used, beside the fork a', the low-toned forks A and C-I devised and recommended by Bezold. I also extended my field of experimentation so that in all cases I determined the upper tone-limit, and when possible the variations in the results of the tests by changes in the intratympanic pressure. I have tabulated¹ the

¹ The table, six pages, is omitted in the translation, the results being fully described in the text.—Ed.

results of these time-consuming experiments, and a study of the table reveals the following :

Forty-five young adults of fairly good intelligence were selected, all of whom presented normal membranæ tympani. Of these, twenty-three had normal hearing, and were subjected to the tests of Rinne, the Weber-Schwabach experiment, and the test for the upper tone-limit, with fairly conclusive results. In fifteen cases the influence of artificially increased or diminished intratympanic pressure on bone- and air-conduction was carefully studied.

Technique of the Examination.

1st. The drum membrane in each case was carefully examined by daylight, and its behavior under auto-inflation and aspiration noted. Cases in which the upper posterior segment of the membrane did not show a distinct bulging on Valsalvan inflation and outward movement of the short process with prominence of the posterior fold were not subjected to the tests.

The hearing was tested in a room sixteen metres long, the ear not tested being closed by the little finger inserted into the external meatus; care was also taken that the patient should not look at the investigator during the tests. Only those persons who were able to repeat perfectly, at this distance, numbers of two figures, whispered as Bezold advises with residual air, and who could also hear the Politzer acoumeter distinctly at this distance, were considered to have normal hearing, and were subjected to the succeeding procedures.

The Weber-Schwabach test was performed with the A fork in the following manner: The fork was struck a medium blow on a soft elastic surface—as, for example, upon the muscles of the thigh, directly above the internal condyle, the knee being flexed at a right angle; the handle of the fork was then applied to the head of the subject, the point selected being situated about on a line with the anterior border of the external auditory meatus. The fork was not pressed upon the skull, but simply rested by its own weight.

The usual precautions observed in conducting tests with tuning-forks were taken.

Schwabach's test depends upon the difference in the duration of bone-conduction in the patient as compared with that of the investigator. In order to measure the difference in time, we availed ourselves of a chronoscope, the second-hand of which could be set in motion at any moment, could be arrested at any part of its course, and returned to 0° or 60° by simply pressing a slide. The difference in time determined by the experiment could then be read off by the investigator at the end of the test. By proper manipulation of the slide of the chronoscope with the fingers of the left hand the experimenter can give his exclusive attention to the right hand, which manipulates the tuning-fork; it thus becomes possible to avoid many errors of experiment which must occur when the ordinary watch is used to determine the difference in time, in which case the eye must not only observe the right hand, which holds the fork, but also the watch held in the left hand. In a similar manner the time difference in Rinne's test was more easily determined. In Rinne A the duration of bone-conduction was measured while the fork was placed on the vertex. In experiments with Rinne a' the fork was moderately pressed against the skull behind the ear at the base of the mastoid process.

For the determination of tone-limits and of the time during which the fork C-1 was heard we instituted control experiments in which the subject was not able to see the investigator. All untrustworthy results have been excluded from the tabulated cases.

In testing with Koenig's rods only one ear was tested.

For the determination of the lower tone-limit the lower bass C (C-1) fork was used, as advised by Bezold. It was stuck upon the flexed knee in the manner already described, as in this way the over-tones seemed to be best avoided. The length of time that this fork was heard was determined in fifteen patients, due allowance being given to the above precautions.

As to the determination of the increase or diminution in bone-conduction under auto-inflation or aspiration, it is un-

necessary, after the teachings of Bezold and the above explanation, to enter more into detail as to how I arrived at my results. Bezold found that this portion of the work was so troublesome and tedious that he was not able to make any exhaustive investigations in that direction. We did not think it wise to fatigue our patients by continuing the pressure of auto-inflation during the entire time of vibration of the fork. It is not important that this should be done, moreover, as the fork A vibrates through a relatively long interval, and slight differences in the strength of the blows might give rise to decidedly divergent results. We proceeded then so that in one series of experiments the value of Rinne's test was determined, while in another series the test was so modified that when the fork was no longer heard by bone-conduction it was held for half a minute in front of the ear, when the patient performed Valsalvan inflation, and continued this until the fork was no longer heard. The difference between the average results of these two series is the number of seconds that air-conduction is reduced by auto-inflation.

A change in the upper tone-limit, in consequence of an alteration in the intratympanic pressure, was noted in those cases only in which it had been determined without question by several parallel experiments.

The determination of alterations in intensity of the higher tones, brought about by auto-inflation, was tested, not by holding the Galton whistle close to the ear, but at a distance of from one to ten feet, since the results obtained in this manner are more distinctive.

Each number given in the table represents an average of the results of at least two, and usually of three or four, similar successive experiments.

Results of the Tests.

The test of the hearing distance in forty-five cases showed that twenty-three were able to understand whispered speech at a distance of fifteen metres. We did not necessarily consider these as possessing normal hearing, and the need of

being cautious on this point was demonstrated by the subsequent use of Politzer's acoumeter and further functional tests. In some cases in which whispered numbers were understood at a distance of fifteen metres perfectly well, but in which the acoumeter was not heard distinctly at this distance, we found regularly other defects, such as the localization of bone-conduction in one ear, lowering of the upper tone-limit, abnormal shortness in the time of Rinne's test, paracousis loci for deep notes, etc. Exceptionally an apparently healthy ear, which perceived whispered numbers at twenty metres and the acoumeter at fifteen metres, exhibited functional defects in the test for the upper tone-limit, and in the perception of sound by bone-conduction. The belief, which is constantly gaining ground, that Weber's test should not be considered of too great diagnostic importance, was confirmed by my experiments. Schwabach's test, which I believe to be of great diagnostic importance, was made with the A fork, as advised by Bezold, and the results were in many instances verified by the fork a', since the vibrating fork gives rise to a sensation peculiar to itself and at least ninety per cent. of my cases were unable to tell whether the vibrations of the fork were simply felt or were heard.

Schwabach's test is particularly valuable in many cases of middle-ear disease in which the duration of bone-conduction for the fork A is much larger and more distinct than when the lower forks are used; here also an error is impossible, since the normal ear hears the fork A several seconds after its vibrations are no longer felt. This condition is very noticeable in most varieties of pure middle-ear affections with increased tension of the auricular ligament, for here, as Bezold has proved, the fork A placed upon the skull is always heard after its vibrations are no longer felt. My table shows that even in the normal ear the duration of bone-conduction may vary in different cases as much as ten seconds. A shortening in the time of Rinne's test is not observed in cases where the Schwabach experiment gives a distinctly positive number. Rinne's test with the A fork was usually positive, varying from + 38 to + 64 seconds,

the average in thirty-seven cases being + 48 seconds. Bezold in his experiments found it to be + 42 seconds. An increased positive value of from 5 to 15 seconds is observed if the tuning-fork, after it is no longer perceived by bone-conduction, is not immediately held in front of the ear but only after an interval of 20 to 30 seconds, as was done in our investigations. Our positive results are, therefore, higher than those obtained by Bezold.

The test for the determination of the upper tone-limit was of special interest to us and gave fairly uniform results. Unfortunately, the Galton whistles are so constructed and graduated that they differ considerably from each other. The testing of the upper tone-limit with the rods *ut* 9, *mi* 9, and *sol* 9 was undertaken in thirteen cases. Seven perceived *mi* 9 as a distinct ringing sound. In no single case was *sol* 9 heard. Six heard *ut* 9. The upper tone-limit then, according to my tests, would lie between *c'* and *e'* of the German scale, as a rule, and usually nearer the latter than the former. Blake found the average upper tone-limit to be *mi* 9. Burckhardt-Merian asserts that two patients tested by him heard *ut* 10, while Blake found still higher tone limits. It is to be remembered, however, that under certain pathological conditions, such as defects in the tympanic membrane, absence of the incus, etc., the upper tone-limit can be raised, and that our results were obtained in individuals whose ears had been carefully proved to be perfectly normal, and not in those in whom any pathological condition of the auditory apparatus existed.

As an important result of another series of experiments it was shown that the Bezold contra C (*C*⁻¹) fork was heard distinctly by forty-five cases tested. When the fork was struck a moderate blow upon the knee, the sound was perceived for from 11 to 23 seconds—16 to 17 seconds being the average. The great difference in the duration of the sound in my experiments and the results obtained by Bezold depends principally upon the difference in the character and strength of the blow setting the fork in vibration.

Aside from these slight variations, my investigations upon a large number of persons with normal hearing confirm the

important fact first observed by Preyer and corroborated by Bezold in his own case, that the note C^{-1} lies within the range of normal audition, and when this note is not perceived pathological changes must be present. We have, therefore, in this low note, whose vibrations are relatively strong and of long duration, an incomparably fine test. For two years we have used this test in all cases where the decision of diagnosis and prognosis has been based entirely upon the result of the functional examination, and we could not do without the instrument. The fact that by a change of the overtone clamps the same instrument can be made to produce the different notes of the contra-octave, gives to it naturally an especial value as a means of determining exactly the lower tone-limit on the octave.

We next consider the influence of artificial changes in intratympanic pressure upon the results obtained in the functional examination of the ear. Like Bezold, we observed radical changes in bone- and air-conduction for the fork A and a difference in bone-conduction for the fork C^{-1} . As we extended our experiments to the upper tone-limit also we observed new and interesting facts.

With reference to the first point under consideration, we also found that, whenever aspiration and auto-inflation were successfully done under the influence of these procedures bone-conduction for the A fork was altered in the manner already stated by Bezold. Bezold found that in his own case during Valsalvan inflation a prolongation of bone-conduction. We found in two cases bone-conduction diminished by auto-inflation; in one case it was unchanged, and in eleven cases the duration of bone-conduction was prolonged for periods of from 5 to 11 seconds, the average being $6\frac{1}{2}$ seconds.

The following case is interesting:

CASE I.—H., æt. twenty-one, suffered from scarlet fever at the age of three, since which time he has had constant otorrhœa. I found upon examination complete absence of the membrane upon each side. The ossicles were present, however, and could be seen through the thin membrane covering them. The malleus and incus were displaced upward and inward, and were adherent in

some places to the mucous membrane of the tympanum. There was no thickening of the membrane over the round and oval windows or in other visible portions of the tympanic cavity. The hearing distance for whispered numbers was : R, $\frac{1}{\infty}$; L, 70 cm. Lower tone-limit, L, F^{-1} . The suppuration soon ceased on treatment. Some time later the patient consulted me for loud tinnitus and dizziness. I resolved to mobilize the stapes directly, but first I performed the following experiment to determine the influence of an increase in tension of the annular ligament of the stapes upon bone-conduction. The tuning-fork A having been set in vibration was held lightly on the skull by an assistant until its tone was lost. During this time I held a pressure-sound free on the meatus. As soon as the patient indicated that he no longer heard the fork, I placed the pressure-sound firmly but lightly upon the incudo-stapedial articulation which had previously been cocaineized. Under the influence of an equable and constant pressure the tone previously lost was again perceived clear and strong through a period of from forty-two to fifty-two seconds (three experiments). The weight and pressure on the head of the stapes also produced a noise which the patient described as a blowing or gurgling sound, from which the note of the fork A could be easily distinguished. The patient of his own accord stated also that he heard the forks A and a' much more distinctly when pressure was made upon the stapes. Forks in which, by means of clamps, the vibration was stopped as soon as the sound was no longer heard by bone-conduction, were used without the knowledge of the patient, and the negative results obtained proved the absolute truth of his answers. Bearing in mind that a more complete closure of the meatus will augment bone-conduction, the experiment was so conducted as to exclude a possible source of error.

The results confirm the observation already made by Bezold, that increased tension of the annular ligament of the stapes prolongs the duration of bone-conduction.

The aspiration experiments gave results in only five out of fifteen cases tested. In all of these the duration of bone-conduction was diminished from 1 to 9 seconds, the average being 6 seconds. Bezold found the diminution to be somewhat greater, viz., 8 seconds. The air-conduction for the fork A was diminished by aspiration as well as by auto-

inflation, the average shortening being 16 seconds, the extremes being 9 and $24\frac{1}{2}$ seconds. I cannot explain the cause of the diminution.

The aspiration experiment was possible only in a minority of the cases, as every Eustachian tube is not sufficiently patent to admit of this procedure. Bezold observed that the low point of the range of audition in his own case was changed both by aspiration and auto-inflation, the tone of the A fork being completely obliterated by the first procedure, and the intensity diminished by the second. Our own results were similar, but not so distinctive.

A distinct and, as far as I know, as yet undiscovered alteration in the hearing power for high notes is elicited during auto-inflation, in that almost without exception the upper tone-limit rises and the highest part of the scale is more distinctly heard. In applying this test one ear is stopped with moist cotton, while the Galton whistle is held at such a distance from the vertex that a certain note sounded upon it is heard faintly or not at all. If now this note is continually sounded, it will be found that when auto-inflation is performed the note will be heard clearly and distinctly. With the cessation of the procedure the note is no longer heard.

On the other hand, it was found during aspiration that in three patients the upper tone-limit was lowered, while in three it was unaffected.

The following case shows in how marked a degree the perception of not only the lowest but also of the highest notes can be modified by changes about the oval window.

CASE 2.—A. L., æt. twenty-five, a few days before he came under observation accidentally forced a small splinter into the right ear, which up to that time had been normal ; there was slight pain but no dizziness. At present there are tinnitus and impairment of hearing. Inspection of the right drum-membrane reveals a fresh round perforation in the upper and posterior quadrant, with pulsation along the upper border. The long arm of the incus and the stapes were visible deep in the perforation, and were very much reduced. The right ear was otherwise normal. The left ear was normal.

- Hearing distance $\begin{cases} \text{R, } 5 \text{ cm (whispered numbers).} \\ \text{L, } > 500 \text{ cm (whispered numbers).} \end{cases}$
- Weber-Schwabach, a', Rt. side + 5 seconds (in the diseased ear).
- Rinne $\begin{cases} \text{R} - 6 \text{ seconds.} \\ \text{L} + 15 \text{ seconds.} \end{cases}$
- Range of hearing $\begin{cases} \text{Rt. ear, Galton, 3 to a (without a break).} \\ \text{Lt. ear, " 1.9 to c}^{-1} \text{ (without a break).} \end{cases}$

If we summarize shortly the most important results of our work, the following principal facts are presented:

I. The healthy ear in youth possesses a hearing distance of from 25 to 26 metres for whispered numbers, and of at least 15 metres for the Politzer acoumeter.

II. Schwabach's test with the fork A reveals not considerable differences in the duration of tone perception even in perfectly normal ears.

III. In Weber's test the fork was heard louder in one ear in one eighth of the normal cases tested.

IV. Rinne's test with the Bezold-Katsch fork A gives in normal cases a positive result, +48 seconds being the average.

V. The upper tone-limit varies little in cases where the hearing is normal. It lies between ut 9 and mi 9, as determined with Koenig's rods ($c^7 - e^7$). With Galton's whistle the range is within .6 of the minor division of the particular note which represents the limit.

VI. The Bezold-Katsch fork C^{-1} (33 double vibrations per second) is perceived in all cases where the hearing is normal for about 16 seconds, the fork being struck a medium blow.

VII. Aspiration of the tympanic cavity shortens the duration of perception of the fork A both by air- and bone-conduction.

VIII. Valsalvan inflation diminishes air-conduction for the fork A, and usually increases bone-conduction (but in one seventh of the cases diminishes it). (Sections VII. and VIII. confirm the results of Bezold's experiments.)

IX. The following result is new: Under the influence of Valsalvan inflation the upper tone-limit is usually raised; frequently also the perception of the highest notes of the

scale is rendered more acute; less frequently the pitch of the middle notes of the scale is altered. Aspiration, on the other hand, either does not influence the upper tone-limit at all, or lowers it somewhat.

X. Air-conduction for the fork c^{-1} is diminished both by auto-inflation and aspiration. In isolated cases the lower tone-limit is raised from c^{-1} to Des^{-1} .

In addition the two following results have been demonstrated in cases in which the inner wall of the tympanum was exposed:

XI. Increased tension of the annular ligament of the stapes through direct pressure upon the stapes augments bone-conduction.

XII. Tamponing the niches of both the labyrinthine windows does not influence the perception of high notes.

RESULTS OF THE FUNCTIONAL EXAMINATION IN CASES OF PURE CATARRH OF THE EUSTACHIAN TUBES.

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Translated by Dr. E. B. DENCH, New York City.

BEZOLD found pure tubal catarrh in nine per cent. of his ear-patients. My own cases show about the same percentage. Thanks to the exhaustive investigations of Lucaë, Schwabach, Bezold, and others, we have advanced so far as to possess in the fine tests for hearing, *i. e.*, Rinne's and Schwabach tests, and the definition of tone limits, a knowledge of a completely characteristic reaction for the normal ear as well as for the pathological conditions known under the terms of nerve deafness, remains of a previous tympanic suppuration, and simple chronic otitis media. On the other hand, for tubal catarrh we have simply the two isolated reports of Bezold on this subject (see these ARCHIVES), which were limited to the observation of the hearing distance and the results of Rinne's test with two forks of low pitch. In the present paper I have undertaken to fill this want and to establish the variations from the normal condition as elicited by a functional examination in Eustachian catarrh. In this part of my paper I have sought to determine also the changes effected by the air douche in tubal catarrh, as evidenced by the difference in the results of the functional examination before and after its use.

In a large number of cases catheterization showed no secretion in the middle ear; the membrana tympani before

inflation was usually depressed, but there were no signs of inflammation. By inflation the membrane resumed its normal appearance and the hearing was improved in a marked degree.

We observed first the functional condition by testing the patients before inflation. The normal hearing distance for numbers of two figures whispered with residual air being 15 metres, in ten cases the whispering distance was 10 to 15 *cm*, in three from 101 to 150 *cm*, and in one case 500 *cm*. In Weber's test, when there was a marked difference in the whispering distance on the two sides the tuning-fork was referred to the poorer ear. The Weber-Schwabach test with A showed in all cases tested a marked increase in bone-conduction, varying from 10 to 19 seconds. Rinne's test, in which bone-conduction was tested from the mastoid process, gave a positive result in but two cases, notwithstanding as high a fork as *a'* was used, and even in those cases the result of the test showed a relative diminution as compared with the normal standard. In all the other cases Rinne's test gave negative results.

The upper limit always was below the normal standard. As tested with Galton's whistle, the limit was found to be 1.9 in those cases; six times it was between 2.2 and 2.9, and three times it was between 3.2 and 3.4. Tubal catarrh then lowers the upper tone-limit.

The lower tone-limit was tested with the Bezold-Katsch *A*⁻¹ fork which by the application of clamps furnished a tone as low as *C*⁻¹ as well as with the *A* fork of the above-named author. In only two cases was *C*⁻¹ heard, and then very faintly. Three times the lower tone-limit was elevated to *Des*⁻¹, twice to *F*₋₁, and twice to *A*⁻¹. In five cases this last fork was not heard, but the first fork heard was the *A* fork of our series.

Coming now to the second part of our work, we consider the second series of our tests, which represent the results obtained by functional examination, in each patient, after the use of the Eustachian catheter—that is, after the correction of the position of the ossicular chain resulting from aspiration.

The changes effected by the air douche in tubal catarrh, as evidenced by testing the patients after its application, are as follows: The hearing distance was markedly increased; as above stated only cases were considered as belonging to this class in which marked improvement in the hearing upon both sides followed this procedure.

The result of the Schwabach test was only slightly altered by inflation, most frequently its value was somewhat increased, but sometimes decreased. The negative results obtained by Rinne's test were reversed, becoming positive in all but two cases; in one case the result was ± 0 .

The upper tone-limit remained unchanged in five cases out of ten; in one case the limit was slightly reduced, in another to a much greater degree; in those cases the upper tone-limit was raised.

The lower tone-limit remained unchanged in two cases, in the remaining twelve it invariably was lowered by inflation. In six cases C^{-1} was the limit. In four of these last cases the number of seconds during which the note was heard was measured. From this it was determined that this time was reduced to from 9 to 7 seconds; the normal average duration being $16\frac{1}{2}$ seconds.

The functional changes brought about by the application of the air douche are, shortly, as follows:

1. Improvement in air-conduction.
2. Augmentation of the lower tone-limit.
3. Shortening of the negative Rinne test, which may even become positive.
4. The upper tone-limit remains unchanged, or the changes are scarcely appreciable.
5. The same remark applies to bone conduction, which still remains stronger.

The cause of this last manifestation, persistence of increased bone-conduction, is, to my mind, partly due to the *hyperæmia ex vacuo* of the tympanic mucous membrane and of the deeper soft parts, which is always present in tubal catarrh. In consequence of this passive hyperæmia, the annular ligament of the stapes is also affected; this rigidity fixes the stapes even after the "aspiration position" of the

ossicular chain has been corrected by inflation. Only later in the course of the disease does this rigidity of the annular ligament entirely disappear, as my cases prove. Hence the persistence of increased bone-conduction.

The above explanation serves also to solve another inexplicable phenomenon (see 4 above), that the upper tone-limit, which is lowered by affections of the Eustachian tube, is not immediately and completely restored. We can easily assume with Helmholtz that the portions of the scala vestibuli lying nearest the oval windows serve to effect the perception of the highest notes, and that these parts suffer also from the passive hyperæmia, and that this anatomical lesion cannot be removed immediately but only gradually.

In direct contrast to the condition found in cases of sclerosis, and in cases which have previously been the victim of suppuration within the tympanum, we find that in tubal catarrh, after inflation, in spite of the great degree of augmentation of bone-conduction, marked shortening of and even negative value of Rinne's test, and the notable narrowing of the tone-limits which still remain, air-conduction can still be relatively very good. Thus a patient under observation heard whispered speech upon the right side at 350 cm, although Rinne's test was negative and the lower tone-limit remained as high as A⁻¹.

We seek in closing to collect the chief results of our work.

I.—The test of bilateral tubal catarrh exhibits the following functional changes:

1. Diminution of air-conduction.
2. Increase of bone-conduction.
3. Localization of the tuning-fork placed on the vertex upon the more affected side.
4. Shortening of Rinne's test, or its reversal to negative.
5. Elevation of the lower tone-limit.
6. Reduction of the upper tone-limit.

II.—The first inflation does not notably influence either the increased bone-conduction or the reduction of the upper

tone-limit. On the other hand, it improves in no small degree the diminished air-conduction and the narrowing of the lower tone-limit, without restoring them to their normal standard. After the air douche the hearing is increased out of all proportion to the increased bone-conduction.

A CASE OF UNILATERAL TOTAL ABSENCE
OF THE LABYRINTH CAUSED BY SCAR-
LATINOUS OTITIS INTIMA.

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A S total absence of the labyrinth is a very rare pathological condition, and also somewhat disputed as to its etiology, the following case might be of some interest, especially as the origin of this abnormality in the present case can be traced back with certainty to a special cause, viz., scarlatinous otitis intima.

Henning N—— was born on February 19, 1883, in one of the suburbs of Copenhagen. Both parents, who are not related to each other, are alive and healthy. Their hearing is normal, and there is not, nor has there been, any case of deafness, deaf-mutism, or any other infirmity of significance as to the etiology of the present case. They have had eight children, of whom the two youngest died as infants from unknown diseases. The deceased, Henning, was the fifth child, and had always been healthy and with normal hearing until three and a half years old, when he was attacked very severely by scarlet fever. He lay for nearly five weeks in a drowsy state, which was now and then interrupted by delirium. During this illness a discharge appeared from both ears, the father being, however, unable to state at what period of the fever this symptom appeared, or to give any other details, except that "a large abscess opened on the right ear and prevented it from being totally deaf." As stated before, the child's hearing was perfectly normal before this disease, but when the child recovered, the parents discovered that it could not hear as before. In this respect the father states that the child's hearing was very different at different periods, it being sometimes so

reduced that the boy was only able to hear words shouted loudly into his ears, while at other times he was able to hear ordinary speaking at some distance, and the father found that the hearing was especially bad when the air was heavy and depressing, and good when the air was light and clear. Further, the parents by degrees discovered that their son was able to hear only with the right ear, the left one being always totally deaf. The child's speech remained tolerably good.

At the usual age Henning N—— was sent to the ordinary school, but as he did not progress much on account of his deafness, he was sent to the Royal Deaf and Dumb Institution in Fredericia.

Here the child was admitted in September, 1891. It was stated then by the director of the institution, Mr. G. Jorgensen, to whom I am indebted for permission to examine the temporal bones of the deceased, that the child had a very fair amount of hearing, his speech also being very good, and the child was even able to sing a song so that the melody could be recognized.

Some time later a purulent discharge from the left ear was discovered. This discharge increased by degrees in quantity, and assumed also a fetid character, although disinfectants were employed frequently. There now appeared signs of inflammation also of the right ear, with redness and swelling of the mastoid region, where large incisions later on revealed pus and caseous particles. After this operation the process was apparently arrested on the right side, while the fetid purulent discharge continued from the left ear. The general health of the boy began to suffer considerably, and at last cerebral symptoms appeared, at first in the shape of convulsions, later on as a comatose state, during which the patient expired on April 4, 1892. As far as the hearing of the deceased during the latter part of his life is concerned, the medical gentleman in attendance, Dr. Chr. Langgaard, to whom I am indebted for the above particulars of the child's last disease, states that the child was able to hear very loud speaking directed straight into the right ear, but during the last five weeks before death the hearing was probably entirely lost.

On April 6th, about thirty-six hours after death, both temporal bones and the brain were removed and forwarded to me from Fredericia. The brain exhibited, by a superficial inspection, signs of purulent inflammation of the meninges, but became unfortunately spoiled from bad preservation.

AUTOPSY.

Left Temporal Bone.

The mastoid process.—The periosteum is easily detached ; the surface of the bone is very uneven and strongly congested. The whole mastoid process, except the apex, is occupied by a large cavity, the walls of which all over, except at the apex, consist of a thin layer of bone, and communicate through a large opening with the tympanic cavity, while it upwards communicates freely with another large cavity formed by the total destruction of the basis of the petrous bone. The roof of this large cavity consists of a bony layer, which is hardly 1 millimetre thick, and corresponds to the superior margin and the two superior faces of the petrous bone. The whole extension of this cavity is seen by the following measures : height, $2\frac{1}{2}$ cm ; lateral diameter, $1\frac{1}{2}$ cm ; antero-posterior diameter, $1\frac{1}{2}$ cm. The wall of this large cavity is moderately smooth in the upper part, while its inferior part is uneven, carious, and covered with granulations. The cavity contains a considerable amount of foul, greenish pus, enclosed by a thin, soft, cobweb-like pyogenic membrane.

The meatus auditorius externus.—The cartilaginous portion has a natural aspect, while the osseous part is the seat of an extensive carious process, which has only left upward a sharp edge, and downward a narrow bridge of bone.

Tympanic cavity.—The tympanic membrane is totally destroyed, neither does there exist any trace of the ossicula auditus, of the normal muscles, or of the chorda tympani. Anteriorly is seen the internal opening of the Eustachian tube, which does not exhibit anything abnormal. The posterior wall is almost entirely formed by a large opening, which represents the communication between the tympanic cavity and the large cavity described above, which occupies the greater part of the mastoid process and the external part of the petrous bone. The facial nerve, which exhibits a normal appearance, is normally situated in its bony canal. The tegmen tympani is considerably extenuated, its inferior surface being uneven and carious. On the internal wall of the tympanic cavity the promontorium appears of normal aspect. The fossula fenestræ rotundæ is present, but the fenestra itself does not exist as an opening, it being replaced by hard bone. The fenestra ovalis exhibits exactly the same appearance.

Labyrinth.—No trace whatever of the normal cavities of the labyrinth is to be found, the whole internal ear and its immediate surroundings being replaced by hard sclerotic bone tissue, in which not even the outlines of the labyrinth can be distinguished. The aquæductus cochleæ is entirely missing; its external aperture being only visible on the inferior face of the petrous bone. *Apertura externa aquæductus vestibuli* is also visible on its normal place, but this canal is otherwise entirely missing.

Meatus auditorius internus.—This canal does not exhibit anything abnormal. Its bottom presents its usual configuration, but there are no foramina cribrosa, the terminal branches of the acoustic nerve adhering to the solid bone which replaces the foramina. The appearance of the nerve itself is normal.

Right Temporal Bone.

Mastoid process.—This part exhibits the same abnormalities on the right side as on the left, the abnormal cavity being, however, somewhat larger, mostly on account of the apex of the mastoid process also forming a part of the cavity. The destruction of bone has also gone farther on this side, the wall, which corresponds to the sigmoid fossa being, in several places, perforated, the largest perforation being about 1 cm. wide and having rough carious edges. The result of this destruction is in this way a communication between the large abnormal cavity and the fossa cranii media. The walls of the right large cavity are all over considerably smoother than that of the left side, and lined in most places with a smooth epidermis-like membrane. The entire cavity is filled with cholesteatomatous masses, which consist under the microscope of numerous round cells, fatty particles, cholesterine crystals, and a few large flat cells containing one or more nuclei.

Meatus auditorius externus.—The anomalies found here do not differ essentially from those of the left side.

Tympanic cavity.—This cavity is filled with the same cholesteatomatous masses as described above. After the removal of these it is seen to be in general like the left tympanic cavity, —the tympanic membrane, the ossicula auditus, etc., also missing on this side. There is, however, one great difference, in as much as the right fenestra ovalis is present and of normal outlines, forming an open communication (without any fibrous tissue

closing the opening) between the tympanic cavity and the vestibule, through which opening the cholesteatomatous masses spread into the labyrinth. The fenestra rotunda exhibits exactly the same anomaly as that of the left side. The whole tympanic cavity is lined with a smooth epidermoid membrane which also covers a natural opening, about 2 mm wide, in the floor of the cavity leading to the jugular fossa.

Labyrinth.—The right internal ear differs considerably from the left, the normal cavities being all present on the right side. The membranous labyrinth is, however, entirely missing, the cavities being only filled with the same cholesteatomatous deposits as mentioned before. The *vestibule* does not exhibit anything abnormal. The *canales semicirculares* are all present and of natural appearance, except the posterior canal, which is somewhat flattened. The *cochlea* does not communicate with the tympanic cavity, the fenestra rotunda being, as described above, closed by a bony plate. The modiolus is entirely missing in the second and third turns of the cochlea, the upper part of this being in this way transformed into a cavity, in which remains of the natural parts of the cochlea are to be seen. There is no trace of the lamina spiralis ossea to be seen in the second half of the first turn of the cochlea, while it is naturally developed in the beginning of the first turn. The aquæductus vestibuli and cochleæ are normal.

Meatus auditorius internus.—No abnormality is present here. The auditory nerve appears healthy and terminates in the natural way.

REMARKS.

The greatest pathological interest connected with this case is the total absence of the labyrinth on the left side, on which, as it will be remembered, the deafness during the life-time of the patient had been complete since the attack of scarlet fever described above. The absence of the internal ear, which was so complete that no traces of the normal labyrinth cavities were to be found, seems to be—according to literature—a very rare pathological condition, this abnormality being up to the present only described by Montain,¹

¹ *Dictionnaire des Sciences Médicales*, Paris, 1819, tome 38, p. 114.

Michel,¹ and H. Schwartz.² Further, the catalogue of the Pathological Museum of the Copenhagen University describes the specimens Nos. 16 and 17 (representing left and right temporal bone of the same individual) belonging to the well known Ibsen collection of temporal bones from deaf-mutes, in the following way: "In both temporal bones the whole labyrinth is missing, pars petrosa forming a solid bony mass." This description is repeated in V. Bremer's,³ J. Mygge's,⁴ and my own⁵ reproductions of the said catalogue, but as a thorough examination and investigation on the occasion of the present paper yielded another result, and also revealed another error concerning these specimens, I think they deserve a short mention. According to Mygge's investigations these two specimens originate from a male deaf-mute, born in 1819 and deceased as a pupil of the Royal Deaf and Dumb Institute of Copenhagen in 1827, and said to have been born deaf, and to have had two deaf and dumb brothers or sisters. An examination of these two specimens shows, however, that the left fenestra ovalis leads into a small hour-glass shaped cavity, the situation and height of which correspond to those of the vestibule; further, a small opening corresponding to the fenestra rotunda leads into another small cavity, which cannot be closer examined on account of the way in which the preparation of the specimen is made, but the situation of which undoubtedly corresponds to that of the first turn of the cochlea. In the petrous part of the right side, where a horizontal section parallel with the axis of the petrous part is made only through its middle (the tympanic cavity being besides opened from above), a small three-cornered cavity is seen where the vestibule ought to be, and this cavity communicates with the tympanic cavity through a narrow

¹ "Mémoire sur les Anomalies de l'Oreille Interne," etc., *Gazette Médicale de Strassbourg*, 1863, p. 57.

² "Beiträge zur Pathologie und pathologischen Anatomie des Ohres," *Archiv für Ohrenheilkunde*, Bd. v., p. 296.

³ *Om det pathologiske Fund hos Døvstumme*, etc., p. 108.

⁴ "Nogle Bemaerkninger om Studiet af Døvstumhedens Ætologi," etc. *Ugeskrift for Læger*, 4th series, vol. ii., p. 22.

⁵ *Die angeborene Taubheit*, p. 51; and "Uebersicht über die pathologisch-anatomischen Veränderungen der Gehörorgane vom Taubstummen," *Archiv für Ohrenheilkunde*, Bd. xxx., p. 86.

opening, situated in the place of the fenestra ovalis. On both sides the bone which has partially replaced the normal cavities of the labyrinth is very white and hard, being distinctly, though without any sharp outlines, separated from the surrounding bone of the petrous part. It will be seen then that these specimens do not exhibit an entire absence of the labyrinth. Further, as the pathological condition of the said specimens gave me the impression of being due to post-fœtal processes, I investigated their origin by means of the official books of the Royal Deaf and Dumb Institution, and found that a mistake had been made, as they originally were taken at the post-mortem examination from a male deaf-mute born 1811 and dead 1817, who had become deaf from an unknown disease when four years old.

In the case of H. Schwartz mentioned above, the labyrinth of the left side was, as in the present case, entirely substituted by solid bone, so that no trace of the internal ear could be detected; on the right side the normal cavities of the labyrinth were replaced by fibrous tissue. According to the report of the father of the deceased child, it had become deaf from meningitis during the fourth year of its life, but Schwartz doubts the abnormalities described to be of post-fœtal origin. There can, however, at present be no doubt that inflammatory processes of the internal ear developed after birth can result in the formation of bony tissue, which can to a more or less degree replace the normal cavities of the labyrinth—a fact I have pointed out in several previous papers.¹ The present case, where the reliability of its history is beyond any doubt, and also confirmed by the pathological changes found in the middle ear, is another proof of the correctness of this opinion, and proves besides that the bone tissue, which is formed as a produce of a post-fœtal otitis intima, is able to fill up the normal cavities of the labyrinth so thoroughly, and assume the appearance of the surrounding bone so completely, that

¹ "Uebersicht über," etc., *Archiv für Ohrenheilkunde*, Bd. xxx., pp. 113 and 118; Larsen and Mygind, Ein Fall von erworbener Taubstummheit, etc., *ibid.*, 196; "A Case of Deaf-Mutism from Measles," etc., these ARCHIVES, vol. xx., p. 318.

every trace of the outlines of the original cavities disappears entirely.

It must, however, be remembered that the total absence of the ear-labyrinth may also be due to foetal pathological changes, of which the case observed by Michel, and mentioned above, is an incontestable proof. In this case, where the labyrinth was entirely missing on both sides, the whole petrous part was deformed, it having only two faces, a superior and an inferior, besides which other congenital malformations were present, among which is especially to be mentioned the total absence of both acoustic nerves. In the case described by Montain and quoted above, the deceased child was said to have been born deaf; according to the short description, the entire labyrinth was absent (on both sides?), which was also the case with the ossicula auditus—a circumstance which, together with the fact that the tympanic cavity was filled with “mucilaginous matter,” seems to make the correctness of the history of the case doubtful.

That the labyrinthine inflammation, of which the formation of bony tissue on the left side was the result, has been secondary to an inflammatory otitis media, is highly probable.¹ The considerable destruction of the normal contents and the walls of the tympanic cavity on both sides seem to prove that the primary inflammation has been very intense. It must, however, be borne in mind, that scarlatinous labyrinth affection in many cases is less due to the intensity of the middle-ear disease than to its special character. Clinical experience and numerous otoscopical examinations of deaf-mutes show anyhow that the primary middle-ear disease not unfrequently is, or has been, comparatively mild. There is even reason to believe that this intermediate link is not necessary for the production of the otitis intima—a circumstance which is especially mentioned by A. Hartmann² and H. Schmaltz.³ The labyrinth inflammation

¹ Compare “Rare Anomalies, both Congenital and Acquired, Occurring in the Ears of a Deaf-Mute,” by S. Moos, *Arch. Ophthal. & Otol.*, vol. ii., part 1, pp. 139–158.

² *Taubstummheit und Taubstummtenbildung*, p. 79.

³ *Die Taubstummen im Konigreich Sachsen*, p. 63.

might then in such cases, where there is no primary inflammation of the middle-ear, be considered as the product of metastasis, the otitis intima being in this way similar to other diseases arising during an attack of scarlatina,—for instance, the scarlatinous nephritis.

That the scarlatinous otitis intima may end in the formation of bone tissue is quite recently proved by post-mortem examinations of S. Moos¹ and Uchermann.² Moos explains the morbid changes found by him in the labyrinth as the result of the immigration of micro-organisms into the endosteal vessels of the internal ear; by this process are produced, on the one side necrosis and destruction of the tissue, on the other side formation of osseous tissue through irritation of the endosteum. The observation of the two cases of S. Moos and Uchermann, together with the present, then, proves that the scarlatinous otitis intima is of a similar nature as the labyrinthitis caused by measles³ and cerebro-spinal meningitis.⁴ This circumstance seems also to speak in favor of the theory touched upon above, viz., that scarlatinous labyrinthitis arising secondary to an otitis media is rather the result of the special character of the primary middle-ear inflammation, than of the intensity of the latter disease.

The critical remarks made in the preceding pages apply principally to the morbid changes observed in the left ear of this case. As far as the abnormalities of the right ear are concerned, the circumstance that the deceased, until some weeks before death, was able to hear fairly well, at least at periods, shows that the destruction found in the labyrinth must, at least principally, be considered as caused by propagation of the cholesteatomatous masses from the tympanic cavity through the fenestra ovalis. There is, however, one pathological change, which undoubtedly has not been

¹ "On the Histological Conditions," etc., these ARCHIVES, this No.

² "Anatomischer Befund in einem Falle von Taubstummheit nach Scharlach," these ARCHIVES, Germ. Ed., vol. xxiii., p. 70.

³ S. Moos, "Untersuchungen über Pilzinvasion des Labyrinths im Gefolge von Masern," these ARCHIVES, vol. xviii., p. 49; and Mygind, "A Case of Deaf-Mutism Caused by Measles," *ibid.*, vol. xx., p. 310.

⁴ Larsen and Mygind, "Ein Fall von erworbener Taubstummheit mit Section," *Archiv für Ohrenheilkunde*, Bd. xxx., S. 188.

caused by a process developed in the latter part of the patient's life, viz., the closing of the fenestra rotunda by a plate of hard osseous tissue, the pathological conditions being exactly the same in both ears and beyond any doubt very old. This fact is of considerable physiological interest, as it, together with the history of the case, proves that a considerable degree of hearing (at least at intervals) might be left after a post-fœtal closing of the fenestra rotunda by an osseous plate. This observation tends, then, to show that the existence in the foramen rotundum of a movable membrane is not so essential to the hearing as generally accepted, according to the theory that the undulations of the labyrinthine liquid caused by the movements of the stapes in the fenestra ovalis during hearing are principally regulated by the membrana tympanica secundaria. There seems reason to believe that in the present case the stapes had been present until a short time before death, as the amount of hearing observed on the right side during the patient's life could not very well be present when the stapes and the membrana tympanica secundaria were absent.

The meningitis observed during the life-time of the deceased patient, and revealed by the post-mortem examination, can easily be explained by the fact, that there was an open communication between the large cavity filled with fetid pus and the fossa cranii media on the right side. The circumstance that the boy had no rational treatment prior to his admission to the Deaf and Dumb Institution is undoubtedly responsible for the fatal termination of this case.

AN APPARATUS OF PRECISION FOR INFLATING AND MEDICATING THE TYMPANUM.

BY THOMAS HUBBARD, M.D., TOLEDO, OHIO.

(With an Illustration.)

POLITZERIZATION has long been the central figure of progress in aural therapeutics. The advance in differential diagnosis in aural diseases has established new indications and limitations for inflation of the tympanum, but we are still largely dependent upon the method of Politzer or some of its modifications. It is my purpose briefly to describe an apparatus, based on the essentials of the Politzer method, that has been gradually developed as the result of practical observations to meet certain clinical demands.

It is obvious to all that the ordinary method of politzerization is, in its details, unsurgical, in so far as liability of introducing septic air-dust into the middle-ear tract is concerned. Also, from a therapeutic standpoint, it is highly important that the air used should be not only non-irritant, but it should be properly warmed and medicated. And it adds to the scientific and practical value of this procedure if it is possible to control and record the degree of tension required for thorough inflation.

It was with a desire to obviate the objectionable features above enumerated, and make such improvements as are suggested, that the apparatus to be described was constructed.

A compressed-air tank is necessary—and I prefer one of large size and low pressure (eight to ten pounds). The air from the tank is cleansed by passing through one or more

wash-bottles containing glycerine before it reaches the inflation apparatus. This latter consists of a quart flask mounted in horizontal position on a suitable standard. At one end is an opening to receive a double perforated rubber cork, through which are inserted the tip of a Devilbiss atomizer and the curved muzzle of a Politzer air-bag. At the other end are two openings, the one being connected by rubber tubing with a manometer, and the other carrying the nasal piece (the large bulbous tip preferred). The compressed, cleansed air is conveyed to the atomizer by rubber tubing having a Devilbiss cut-off near the atomizer so arranged that one hand can manipulate both the cut-off and the Politzer air-bag.

The manometer is of the simplest possible construction. It is made of a U tube of about two millimetres diameter of calibre, each arm being about ten inches long, having a scale graduated in inches from the point of equilibrium between the two columns of mercury. It should of course hang perpendicularly. One pound pressure is represented by two inches of mercury, referring of course to pounds per square inch.

To operate the apparatus it is first necessary to heat the water in the flask or pour in hot water, medicated or not as may be desired. The fluid in the atomizer cup should also be hot. The tubes having been connected as directed and the cut-off opened, a cloud of vapor emerges from the nasal piece. The patient is directed to take a little water in the mouth, and, the nasal piece having been inserted and the other nostril closed, he should inhale the vapor until the upper air passages are filled. As the order to swallow is given the operator should watch the manometer and with the hand note the degree of pressure in the air-bag. The cut-off should be kept open, and by careful manipulation of the air-bag the degree of pressure can be regulated accurately. In most patients it will be possible to sustain the pressure for several seconds. If the operator have any fear of over-inflation the air-bag may be held half compressed, thus allowing some room for expansion and relief of pressure if it approach a dangerous degree. Experience soon fixes

the range of pressure in individual cases. The Eustachian catheter can readily be substituted, and direct inflation practised with equally reliable registration of air-tension.

A brief review of the special features of this method of inflating the tympanum may now be in order.

The air entering the Eustachian tube is warm and medicated. This does away with the element of spasmodic resistance due to the shock of the cold air douche. The impact within the tympanum is less violent, since the comparatively large volume of air under compression (in flask and air-bag) imparts a considerable degree of elasticity. The shock is lessened very materially by the fact that the manometer is in connection with the volume of compressed air, the yielding mercury column serving as a safety valve, as it were. Thus the latter may be said to add two desirable features—that of scientific accuracy and safety. Intelligent patients will often so retard the act of swallowing that the pressure can be maintained for several seconds, and I have occasionally been able to see the vapor issue from the external auditory meatus in cases of dry perforations. Where there is pus within the tympanum continuous pressure cleanses more thoroughly than sudden momentary inflation.

The aseptic feature recommends itself, and especially in suppurative cases running a natural course, where it is desirable to displace the pus from the tympanum and yet not introduce any new septic germs.

By the substitution of a small tip for the nasal piece the aseptic medicated vapor can be directed into the Eustachian catheter, which latter should of course be sterilized before introduction. An intelligent patient can adjust the nasal piece properly, and the operator can then inspect the drum-head during the act of inflation (with or without catheter) and secure reliable information as to its condition, presence of adhesions, etc.

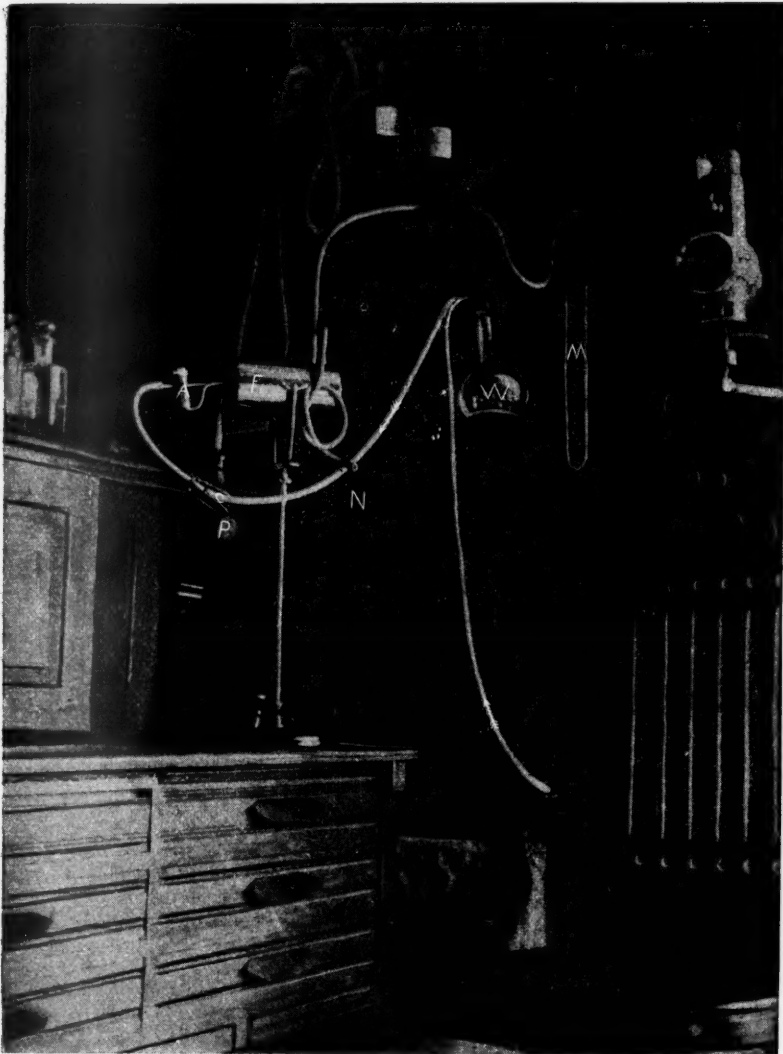
It is observed that the manometer is in direct and free connection with the vapor flasks. We are positive then that we have a reliable index of the pressure exerted within the apparatus and the nasal passages. When the inflation of the tympanum is a single brief impulse we cannot measure

the tension so accurately as where it is maintained over a few seconds, as usually obtains in the method described, since the supply of compressed vapor is continuous. We can feel confident that we have a correct reading of the pressure within the Eustachian canal and also the tympanum when positive that it has penetrated to the tympanum. It is at least certain that the pressure can at no point be greater than that indicated by the manometer.

A maximum pressure of ten pounds in the compressed-air tank has been referred to as the limit of safety. The apparatus can be so modified that any desired pressure can be tolerated, but there is really no object in using a higher pressure than ten pounds, provided the conducting tubes etc. do not produce too much friction in the air current, thus materially reducing the initial pressure. It may be said in explanation that I always measure the air pressure *at the cut-off*, thus getting the actual pressure used, so that the question of friction in the conducting tubes can be ignored.

As regards the degree of pressure within the inflation apparatus we find that in ordinary cases less than two pounds is sufficient to inflate the tympanum. Generally one and one half pounds' pressure suffices, and in many cases one pound or less produces the desired effect. Usually we can take the patient's word, or accept the description of the sensation, as proof of penetration, but the diagnostic tube gives the most satisfactory testimony of the condition of the canal and tympanum. The position of the head has considerable influence in the patency of the Eustachian orifices. By turning the head to the extreme right the left orifice is made patulous, and *vice versa*.

The water in the flask can be medicated as desired. The addition of oil of tar, eucalyptol, or iodine would meet special indications. Wine of ipecac and terebene have also been used. Iodide of ethyl and menthol suspended in oil of vaseline have a most agreeable effect when sprayed into the flask and then forced onward into the tympanum. The Devilbiss drop-cup atomizer is best adapted to this apparatus, since it requires but moderate pressure to produce a



An Apparatus of Precision for Inflating and Medicating the Tympanum.

A = Atomizer
C = Cut-off
F = Vapor-flask
M = Manometer

N = Nasal piece
P = Politzer air-bag
W = Glycerine wash-bottle

fine spray of medicated oil of vaseline. The steam from the vapor flask tends to make more permanent the fine oil spray.

The vapor flask was constructed for me by A. Devilbiss, Jr., Toledo, O.

ON FIVE CASES OF OTITIC BRAIN ABSCESS
WITH A SHORT DESCRIPTION OF OTITIC
BRAIN ABSCESES IN GENERAL.

By H. HEIMAN, WARSAW.

Translated by Dr. WARD A. HOLDEN.

THE brilliant results obtained by English and German surgeons in the domain of the operative treatment of brain abscess has lately awakened the general interest of surgeons and otologists, and on all sides there has been an endeavor to render more certain the diagnosis of this important and dangerous disease. It must, however, be confessed that, notwithstanding all the efforts made, we are still far from being able to make a positive diagnosis in all cases. In the solution of the question, it seems to me that a report of every case observed may be of value in giving new signs by which an early diagnosis may be made. With this view the following paper was written.

CASE I.—M. J., æt. twenty-three, was received into my department March 23, 1888, with a chronic otorrhœa on the right side. For three weeks he had had a severe continuous headache on the right side, with complete loss of appetite. The anæmic and emaciated patient found the recumbent posture the most comfortable. A change of position at once brought on giddiness. The right parietal and frontal region is sensitive on percussion, and the latter increases the headache. The patient is conscious, but his answers are slow, and he is apathetic. The pupils are contracted, but respond readily to light; photophobia; cutaneous and joint reflexes increased; tongue dry, blue, and tremulous; anorexia; temp. 37.2° ; otorrhœa; central perforation both

Mtt. Hearing diminished ; osseous conduction preserved. The patient had 1.0 of calomel and an ice bag to the head. Condition unchanged until March 29th.

March 30th.—Vomiting, pulse 52, temp. 37° . The patient would take no nourishment voluntarily and was given milk through a tube. The apathy is increased, and the patient sleeps almost continuously. Otherwise the symptoms are as before. Antifebrin had no effect upon the headache. The patient remained in this condition until April 6th.

April 7th.—Pulse 44, thready, and intermittent ; temp. 36.5° ; semi-comatose condition. Extremely severe diffuse headache, causing groans.

April 8th.—Pulse 72, temp. 36.5° . The patient rises in bed. Ptosis of left upper lid, contraction of right pupil, stasis in the retinal vein of both eyes, paresis of right facial nerve, constipation, moderate purulent discharge from both ears.

Pot. iodid. given. The local and general condition remained the same until April 12th, when the temp. was 37.4° , and the pulse 80. Both pupils dilated, left more than right, both reacting sluggishly to light. Paresis of the right limbs. The patient does not speak, but drinks milk eagerly. No particular change occurred until April 22d, when the temp. was 38.3° , pulse 64. Severe headache ; marked ptosis of right upper lid. Slight twitching of the left limbs ; mind dull. The patient talks slowly to himself. A disagreeable odor from the mouth ; tongue dry. The smallest quantities of fluid are at once vomited. Involuntary passages of urine and fæces. Heart's action weak. The condition remained the same until the following day when the patient died.

Diagnosis : Chronic otitis media purulenta, both sides ; cerebral abscess in right frontal lobe.

Autopsy : The dura mater is pale and tense. After its removal the surface of the brain appears pale and œdematous, the convolutions are flattened, and on the right side are very indistinct. When the brain was removed 100 grm of fetid green thinly fluid pus with flocculent fibrinous masses escaped from the interior. The right hemisphere contained a large encapsulated abscess cavity which involved the temporal, the parietal, and in part the occipital lobe ; internally it extended to

the optic thalamus. The lateral ventricles contain some serous fluid. The cerebral substance surrounding the abscess is healthy. At the spot where the abscess burst, the brain is adherent to the dura of the temporal bone. The dura from the petrous portion of the temporal bone after its removal is seen to be thickened and perforated. The corresponding spot in the temporal bone is rough and has a small carious opening which leads directly to the tympanic cavity. In the latter there is some pus, and the mucous membrane is ulcerated at some points.

When the patient was first admitted to the hospital the diagnosis was uncertain between meningitis and cerebral abscess. Three days later the symptoms pointed to abscess. The abscess however, for reasons not under my control, could not be opened. Death followed from œdema of the brain, but chiefly from general debility, interference with important cerebral functions, and general atrophy. The case almost reached its termination before fever came on.

CASE 2.—J. B., æt. twenty-two, a Cosack, came under my care May 13, 1888, with otorrhœa, deafness, and pain in the head on the right side. Six months before, he fell from a horse and sustained a slight contusion of the head, and immediately thereafter a muco-purulent discharge commenced in the right ear and lasted some weeks. After this the patient was well until a week ago when the symptoms mentioned above appeared. The right *Mt* is opaque and retracted in the centre; after politizerization it bulges forward. $H : L \div \frac{1}{2} 24$; $V = \frac{6}{80}$. Severe pain in right side of head, left ear healthy, no fever. Pulse 72. The patient is strong and well nourished. Potass. brom. was given. This condition remained the same, there being but little headache, until May 26th, when the right *Mt* became perforated and a muco-purulent discharge appeared. Four per cent. boric acid was dropped into the ear. June 12th, the discharge ceased and soon after pain commenced in the right mastoid, which was worse upon pressure. Temp. $38^{\circ} C.$, pulse 90. Mastoid pencilled with tinct. iodine.

June 13th.—Temp. 37.7° , pulse 84. Mastoid tenderness less marked. Evening temp. 38° .

June 14th.—Temp. 38° , pulse 84. Moderate muco-purulent discharge from right ear and tenderness of right temporal region. Constipation. Four leeches applied to right mastoid. Infus. sennæ comp. given. Evening temp. 38° , pulse 78.

June 15th.—Temp. 38.4° , pulse 90. Otorrhœa ceased; pain in

right side of head; mastoid not tender. Cutaneous and tendon reflexes increased. Patient feels dull. Evening temp. 40° , pulse 90.

June 16th.—Temp. 38.2° ; pulse 60, full and hard. Pain in right temporal and occipital region increased by percussion. The patient prefers the recumbent posture. Movement causes nausea and giddiness. Wilde's incision made. Ice-bag applied to head. Calomel and jalap given internally, causing some passages, after which the headache diminished. Evening temp. 38° , pulse 60.

June 17th.—Temp. 38.6° , pulse 72. Evening temp. 39.5° , pulse 84.

June 18th.—Headache severe again. The tongue is coated and is tremulous when protruded. Pupils evenly contracted, but responsive to light. Fundus normal. At 4 P. M., severe chill, lasting two hours, with very severe headache. Evening temp. 39° , pulse 60.

June 19th.—Temp. 38° , pulse 66. Evening temp. 39.7° , pulse 84.

For the last four days the headache was particularly severe late in the afternoon. Antifebrin lessened it somewhat. From June 23d to June 28th there was no fever, and the pulse varied between 60 and 70. The headache was not so severe.

June 28th.—Temp. 38.2° , pulse 72. No fever again until July 4. Pulse varied between 60 and 84. The headache was localized as mentioned above.

July 5th. Temp. 37.5° , pulse 60. Change of posture causes excessive giddiness. The right pupil is dilated. Evening temp. 38.2° , pulse 62.

July 6th.—Temp. 38.1° , pulse 90. Evening temp. 39.6° , pulse 96. Severe pain in right side of head.

July 7th.—Temp 38.5° , pulse 100. Evening temp. 38.6° , pulse 100. At night severe chills and almost unbearable headache. Antifebrin had no effect.

July 8th, 9th and 10th.—Temp. 37.5° . Evening temp. 37.4° , pulse 90.

July 10th.—Severe chill, increased pain in head. Temp. 39.5° at time of chill.

Until July 18th the condition remained unchanged. Temp. from 37.2° to 38.2° , pulse 72 to 68.

July 19th. Temp. 36.8° , pulse 66. Severe pain in parietal region. Nausea and vomiting. Continued constipation. Cutane-

ous and tendon-reflexes diminished. Evening temp. 37.6° , pulse 64.

July 20th.—Temp. 37.3° , pulse 62. At night patient restless, unconscious, and delirious for some hours. Consciousness has returned. Patient apathetic. He speaks slowly and unwillingly. Severe blepharospasm. Right pupil contracted. Lower extremities partially contracted and stiff. Complete loss of appetite. The operation, which I had urged several weeks before, was still put off.

July 21st.—Temp. 37.3° , pulse 48.

July 22d.—Temp. 37° , pulse 48. Patient conscious and speaks slowly. Paresis of right facial nerve. The entire skull sensitive on percussion. Change of posture increases the spontaneous headache, so that the patient holds his head in both hands and groans. When raised he falls back upon the left side. The ear again shows a muco-purulent discharge. At night the patient is delirious and has convulsions. This condition soon became one of absolute coma and the patient died July 23d.

Diagnosis: Subacute purulent otitis media, right; abscess of right frontal lobe of the brain.

Autopsy: The dura of the calvarium is pale. The surface of the brain is oedematous. The white substance of the right temporal and occipital lobes contains two abscesses, the one in the temporal lobe the size of a pigeon's egg, and that in the occipital lobe the size of a walnut. Both are encapsulated and are filled with fluid, green, offensive pus in which are a number of fibrinous masses. They are separated from each other by 2 cm of healthy brain substance. The inferior surface of the cerebellum is covered with the same pus. The dura above the right petrous portion of the temporal bone is thickened, and above the tegmen tympani a bit of gray cerebral substance, 1 cm sq., is adherent to it. The transverse sinus contains fluid pus. After being removed from the petrous portion of the temporal bone, the dura is seen to be thickened and perforated. The bone shows two dark softened points through which a sound can be passed into the tympanic cavity. The tympanic cavity contains inspissated pus.

In this case, which ran a classic course, one of the abscesses burst into the cranial cavity. The abscess was com-

plicated with purulent thrombo-phlebitis of the transverse sinus. It opened into the cranial cavity apparently at the spot where the brain was adherent to the dura, although a direct connection between the abscess and the petrous portion of the temporal bone could not be discovered at the autopsy. The operation was postponed too long, but it would have been unsuccessful, since the second abscess had not been suspected. The case presented no diagnostic difficulties.

CASE 3.—M. G. æt. twenty-four, was admitted Aug. 26, 1888, with severe pain in the right ear and right side of head. The patient had suffered with periodic otorrhœa, right, since childhood. Six days before, the discharge had commenced again and continued four days, when it ceased, at which time severe pain appeared in the right side of the head. In the right *Mt* is an old dry perforation. The mastoid is not painful. Air- and bone-conduction preserved. Left ear normal. Percussion of the right temporal and occipital regions causes some pain. Both pupils are moderately dilated, but respond to light; fundus normal. The patient prefers the recumbent posture, as sitting up or walking increases the headache and causes nausea and vomiting. The patient is weak and apathetic, but answers readily all questions. The tongue is moist, blue, and tremulous. No appetite. Bowels regular. Temp. 38.3° ; pulse 90, full and hard. Besides a slight enlargement of the spleen nothing pathological was found. Four leeches were applied to the right mastoid, an ice-bag was put on his head, and infus. sennæ given internally.

Aug. 27th.—Temp. 39.2° , pulse 90, resp. 16. Intermittent piercing pain in the right temporal region; the tip of the right mastoid sensitive. Ear dry. The patient rises up in bed easily, but soon feels giddy. Evening temp. 39.4° , pulse 60. At 11 o'clock in the evening severe pain developed suddenly in the right half of the head, excepting the frontal region. Following this there were vomiting, delirium, convulsions in all the limbs, coma, cyanosis, and Cheyne-Stokes respiration, and the patient died in the morning of Aug. 28th.

Diagnosis: Chronic dry perforation of right membrana tympani. Circumscribed external meningitis of right side. With the appearance of the late symptoms, a rupture of a cerebral abscess was diagnosed.

Autopsy: The dura is pale, surface of brain œdematous. The right lobe of the cerebellum is adherent at some points to the dura. There are two small fistulous openings in its surface, which lead into the interior of the lobe, where there is an incapsulated abscess the size of a pigeon's egg, containing an offensive green thin fluid pus with fibrinous flakes. The neighboring portion of the cerebellar substance is soft and œdematous. The lateral ventricles both contain great quantities of serous fluid. The inner surface of the dura covering the petrous portion of the temporal bone is coated with thin fluid offensive pus and fibrinous masses. There is a considerable collection of pus between the dura and the bone. The pus communicates with the transverse sinus through an opening in the latter. In the sinus is a thrombus, red externally, nearer the centre yellow, and in the centre consisting of pure pus. The surface of the pyramid which corresponds to the tegmen tympani is rough, and has two openings which lead directly into the tympanic cavity. The latter contains inspissated caseous pus. The mastoid is intact.

The symptoms might have indicated a cerebral abscess, but might also have occurred with a purulent middle-ear inflammation or with a circumscribed meningitis. A cerebellar abscess was the last thing to have been suspected. The otitis led to caries of the tegmen tympani, to an extradural and then to a cerebellar abscess, which latter at a late stage was complicated with thrombo-phlebitis of the transverse sinus. Death was caused by acute œdema of the brain and hydrops of the ventricles.

CASE 4.—P. T. æt. twenty-four, was admitted Nov. 26, 1891, for a left otorrhœa of seven months' duration. Patient has performed his ordinary duties and has had no medical treatment. Ten days ago severe pain began in the left mastoid and grew worse daily until two days ago, when, with the appearance of a tumor at the painful spot, it ceased. The left temporal region and the left eye are œdematous. The left external canal contains a quantity of green pus. The upper wall of the canal is bulging, narrowing the lumen so much that inspection of the deeper parts is impossible. The existence of a perforation was shown by inflation. At the upper margin of the mastoid, close to the insertion of the auricle, is a fluctuating tumor the size of a

walnut. The skin is red. Air- and bone-conduction are preserved, but diminished on the left side. The head is free, there being no points sensitive to percussion. Both pupils are equally large, and both react to light. Fundus normal. The patient feels well, but is somewhat dull and weak. The appetite is good, bowels regular, tongue coated. Temp. 37.6° , pulse 84. Nothing abnormal was found in the other organs. The fluctuating part was opened by a Wilde's incision. Twenty *grm* of thinly fluid, greenish, offensive pus escaped. Pressure in the temporal region emptied a quantity of pus. The mastoid and a part of the squamous portion of the temporal bone were laid bare, but were intact. The wound was cleaned with bichloride solution (1-1000), filled with iodoform gauze, and bandaged. Evening temp. 37.8° , pulse 86. The dull feeling continued.

Nov. 27th, the following day—Temp. 39.5° , pulse 100. The patient is cheerful although somewhat dull. The moistened dressing was changed. Considerable pus came from the wound.

Nov. 28th.—Temp. 39.50° , pulse 108. The patient sat up in bed and conversed, when suddenly an unbearable headache came on. With this there was a chill and vomiting. In some minutes the patient lost consciousness. Both pupils were very large and did not respond to light. The bulbar conjunctiva lost its sensibility. The lips were covered with frothy mucus. The face was cyanotic. Cheyne-Stokes respiration. Paralysis of all extremities. All reflexes wanting. Pulse 88, tension of vessels low. The wound behind the ear is dry. In this condition the patient died the same day.

Diagnosis: Chronic purulent otitis media, left, abscess of mastoid process. Rupture of cerebral abscess into lateral ventricle.

Autopsy: The blood-vessels of the dura are hyperæmic, the dura itself normal, the arachnoid tense. A greenish-yellow fluid is seen in the sulci. The brain is adherent to the dura at the posterior surface of the left petrous portion of the temporal bone. The base of the skull is covered with a purulent fluid. The left temporal lobe shows a small fistulous opening on its lower surface, which leads into the brain substance. Slight pressure on the surface of the brain causes green thinly fluid pus to trickle through the fistula. In the white substance of the left temporal lobe is

a capsulated abscess cavity the size of a pigeon's egg. The surrounding brain substance is oedematous and somewhat soft. The capsule has an opening which leads into the left lateral ventricle. The latter contains a quantity of pus. Macroscopically the pus from the Wilde's incision, from the base of the skull, from the abscess, and from the ventricle was similar. The staphylococcus pyogenes aureus and streptococcus were found in all. The remainder of the cerebral hemispheres is anæmic. The cerebellum, corpus callosum, and medulla are normal. In the superior longitudinal, the transverse, and the superior and inferior petrosal sinuses there is dark fluid blood. After removing the dura from the bone it is seen that the plug of pus fills a perforation in the dura about 4 mm square. The dura is much thickened and its outer surface is covered with pus and fibrinous masses. The corresponding portion of the bone is also covered with pus, and in the tegmen tympani is a small carious perforation, surrounded with rough and blackened bone, leading into the tympanic cavity. The mastoid process and the remainder of the temporal bone are normal. The internal ear and the porus opticus as well as the auditory nerve are normal. The mucous membrane of the tympanic cavity on the left side is thickened, red, and is easily detached from the bone.

In this case, which in its course simulated an acute purulent periostitis of the mastoid process complicating an otorrhœa, no suspicion of the severe cerebral disease was aroused, and the diagnosis was made only when the abscess discharged into the lateral ventricle. The patient's dulness was marked, but from this symptom alone we cannot make a diagnosis of cerebral abscess. Only the late symptoms left no doubt as to the nature of the disease. The immediate cause of death was the discharge of pus into the left lateral ventricle, the symptoms of which may simulate those of apoplexy, when there has been no aural affection and the patient has not been observed previously. One point should be noticed, viz., that the pus in the abscess, that at the base of the skull, that in the lateral ventricle, and that in the mastoid, presented the same characteristics, and therefore it is reasonable to suppose that the contents of the mastoid abscess came directly from the cerebral abscess. But as the

temporal bone was found to be sound, and there was no connection between the tympanic cavity and the subcutaneous tissue of the mastoid region, and as there was no pus in the normal openings that connect the cranial cavity with the external skin, the path of the pus from the cerebral abscess to the mastoid region is not clear. Perhaps it was the large emissary at the junction of the three sutures (asterion).

CASE 5.—N. K., æt. twenty-four was admitted Jan. 2, 1892, with an otorrhœa on the left side, which began two years previously without assignable cause. The patient is extremely emaciated. The entire body is covered with scorbutic patches. He is apathetic, speaks with an effort, lies recumbent on his right side. Walking or sitting up is difficult. The left pupil is contracted; the lower branches of the left facial nerve are parietic. Percussion of the skull is not painful. Considerable discharge of pus from the left ear; the *Mt* shows a large, old perforation; the mucosa of the tympanic cavity is ulcerated, and in the depth of the cavity are inspissated purulent masses, which are adherent to the walls. Air- and bone-conduction are preserved in both ears. Temp. 36.9° ; pulse 56, and weak. Loss of appetite. Bowels normal. Evening temp. 37.1° , pulse 54.

Jan. 3d.—The patient complains of pain in the left ear. Vomited once. Temp. 36.9° , pulse 50.

Jan. 4th.—Temp. 36.8° , pulse 50. Excessive discharge from left ear. Left mastoid and neighboring temporal region sensitive on percussion. These parts were pencilled with tinct. iodine, and potass. iodid. was given internally. Evening temp. 36.4° , pulse 48.

Jan. 5th.—Temp. 36.1° , pulse 42. The patient feels weak and apathetic, and lies in bed on the left side the entire day. Paresis of the right extremities was observed. The sensibility of the right leg and arm was reduced. The patient cannot walk without assistance, and drags the right leg. The fundus is normal; the pupils react well. There is no spontaneous headache, but it is brought on by percussion of the left mastoid. Vomited twice. Bowels regular. Evening temp. 36.9° , pulse 40.

Jan. 6th.—Temp. 36.2° , pulse 36, resp. 20. The patient is half comatose. The symptoms of the preceding day are increased. An operation was decided upon, and was performed at

3 P.M. An opening 4 mm square was made by trephining at a point 1 cm above and anterior to the superior margin of the auricle. The dura was pale and did not pulsate. The cerebral substance beneath the dura was of a pale yellowish color, and protruded somewhat. A knife was passed 4 cm into the cerebral substance. After introducing a canula, 60 grm of green thinly fluid offensive pus escaped. Passing the finger into the wound an abscess cavity the size of a goose egg was discovered, with an irregular wall, reaching inferiorly to the temporal bone, though this was not left bare. A drainage tube was introduced and the cavity filled with iodoform gauze. Soon after the operation the patient regained consciousness, and talked. Evening temp. 37.8°, pulse 20, resp. 20. He soon relapsed into a half-comatose condition, both pupils being moderately contracted.

Jan. 6th.—Temp. 38.9°, pulse 76–84. Restless at night, feels well but has headache. Paresis of right extremities somewhat less. The otorrhœa is as before. Gauze removed and wound syringed with 1:2000 bichloride solution. Evening temp. 38.5°, pulse 78. Retention of urine and fæces.

Jan. 7th.—Temp. 38°, pulse 78. The patient makes the same reply to all questions. The paresis of the extremities is not marked. The facial paralysis as before. Marked œdema and injection of left eye and temple. When syringed, necrotic masses were removed from the abscess cavity. Evening temp. 38.2°, pulse 72.

Jan. 8th.—Temp. 38.6°, pulse 76. Somnolence, paresis of extremities more marked; no other change.

Jan. 9th.—Temp. 39.6°, pulse 72. The right extremities are almost entirely paralyzed and have lost their sensibility.

Jan. 10th.—Temp. 39.2°, pulse 76. The right pupil is contracted, both react sluggishly. Fundus normal. The patient speaks only a few words, and groans at times. Involuntary passage of urine, vomiting. A quantity of necrotic masses removed from the abscess cavity. Evening temp. 39.4°, pulse 90.

Jan. 11th.—Temp. 40°, pulse 94 and weak. Both pupils much contracted and irresponsive. Conjugate deviation to right. Nystagmus. Complete paralysis of right limbs and of both facial nerves, tetanic spasms in all the limbs. Patient died at 8 P.M.

Diagnosis: Left suppurative otitis media chronica, caries of tegmen tympani, abscess in left temporal lobe.

After Operation : Diffuse meningitis, thrombosis of transverse sinus.

Autopsy, three days after death : Prolapsed brain substance filled the osseous wound, dura hyperæmic, left hemisphere mottled with extravasations of blood. The sulci contain purulent fluid. The pia is opaque. The left hemisphere was almost totally destroyed. With the exception of the anterior portion of the frontal lobe and the posterior portion of the occipital lobe, the entire hemisphere consists of a reddish pulpy mass enclosed in a thick capsule. This mass is similar to the necrotic bits removed by syringing. The base of the right hemisphere, the pons, and the cerebellum are covered with thick yellow pus. The third ventricle also contains pus. The left transverse sinus contains a yellow thrombus. When opened a quantity of dark blood escaped. The dura covering the tegmen has a small perforation. The bone here is eroded and shows a carious opening which leads into the tympanic cavity. There is no pus between the dura and the bone. The malleus and incus are wanting. *The mastoid process is healthy.*

In this case it was possible to diagnose the abscess early, to locate and to open it. The slowing of the pulse and the general weakness and apathy depending on increased intracranial pressure indicated an abscess. The diagnosis was supported by the paresis of the extremities of the opposite side, the coma, the manner of development of the paralyses, and their increase with the increase in the other symptoms. The general weakness, etc., were points duly considered. The abscess was located in the left temporal lobe for the reason that the tegmen tympani was diseased, and further for the reason that the symptoms pointed to this location in contradistinction to other regions of the cerebrum or cerebellum.

The symptoms spoken of by all authors, viz., *fever*, and *headache*, spontaneous or on percussion, *were wanting*. Fever may have existed at an earlier period, but during the patient's stay in the hospital it was absent. Headache was absent in the entire course of the disease. It is impossible to say why such a general meningitis and cerebral necrosis developed three days after the operation. Possibly the probing and

examination with the finger may have caused it, perhaps also the pressure of the drainage tube on the opposite cerebral surface, or it may have been simply the result of cutting into the softened cerebral substance. We cannot, however, deny the influence of the operation and the subsequent manipulation on the development of secondary inflammatory processes in the brain and its membranes, for we know that often the slightest injury of the cerebral substance leads to the most severe and fatal cerebral inflammation. The great destruction of the left hemisphere which was found at the autopsy must have been caused after the operation, as such a condition was not found after opening the abscess and the clinical symptoms were against it. The severe local and general symptoms which threatened the life of the patient made it necessary to open the abscess before the removal of the diseased parts in the middle ear and in the temporal bone. The prolapse of cerebral substance must be regarded as the result of increased intracranial pressure.

Although this case resulted unfavorably, it is instructive, as it shows that fever and headache are not constant symptoms of otitic brain abscess and that therefore their absence does not preclude the possibility of an abscess existing when other characteristic symptoms point to it.

REMARKS ON THE PRECEDING CASES.

In the five cases the diagnosis was made three times at an early stage and twice after the rupture. The localization was wrong in Case 3, the autopsy showing an abscess of the cerebellum and not of the cerebrum. The histories show that each case had some peculiarities which were wanting in part or altogether in the others. This variability of the symptoms has been mentioned by other writers. If we consider Cases 2 and 5, which were under extended observation and in which a low degree of fever developed only on the day before death (2), or was altogether wanting (5); and on the other hand consider Cases 4 and 5, in which headache was wanting in the entire course of the disease, we must conclude that otitic brain abscess may run its course without fever and without headache. As this was found twice in five

cases, the absence of these two important symptoms cannot be unusual. Vomiting, debility, lassitude, and a normal fundus were always present. There was loss of appetite in 4 cases; constipation in 3; tremulous tongue in 3; emaciation in 2; focal symptoms in the last stages in all cases; ptosis in 1; blepharospasm in 2; contraction of the pupils in 3; greater contraction of pupil on diseased side in 2; paresis or paralysis of the facial nerve on the side opposite the abscess in 3; contractures, convulsions, hemiplegia, local anæsthesias, increased and later diminished cutaneous and tendon reflexes, were more or less marked in all cases. The intellect was clouded twice in the late stages, and at intervals in one case. The abscess was on the right side in 3 cases, twice in the cerebral hemisphere, once in the cerebellum. In 4 cases there was a single abscess, in 1 case, two. Uncomplicated abscess in 3 cases; complicated with thrombophlebitis in 3. Extradural collections of pus were found in 2 cases. Death was due to rupture of the abscess into the cranial cavity in 2 cases; into a lateral ventricle in 1; it was due to cerebral œdema and interference with vital functions in 1; and to encephalo-meningitis after operation in 1. All the abscesses were encapsulated and their contents were offensive.

This grouping of the symptoms in these five cases shows that there are but few symptoms common to all, and shows further that none of these symptoms, regarded individually, is pathognomonic of otitic brain abscess. The ætiology, the careful weighing of the symptoms, the duration and the length of time that the patient has been under observation, are all points that must be taken into consideration in making an early diagnosis. In some cases one to two days will be sufficient time in which to make a diagnosis, in others several days or some weeks will be necessary. It is of course possible that some patients may be lost by waiting, but I believe that no one should open the cranium and puncture the brain without a reasonably certain diagnosis having been made, for in spite of our antiseptic treatment we are not yet able in all cases to prevent infection of the wound or a fatal encephalo-meningitis.

GENERAL REMARKS.

The otitic abscesses make up from one half to three fourths of all the cases of brain abscess. Gowers,¹ in 173 cases, found 102 of otitic origin, 57 traumatic, 6 from nasal disease, 3 from orbital disease, and 5 from caries of other cranial bones.

Otitic abscesses may occur in any part of the brain, but are more frequently found in the hemispheres, and in the lobes of the cerebellum, more frequently in the white than in the gray matter. Abscesses are rarely found in the central ganglia or in the medulla. Barr² in 76 cases found the abscess in the middle lobes of the cerebrum 55 times

" " cerebelum	13	"
" both cerebrum and cerebellum	4	"
" the pons	2	"
" crura	2	"

Körner³ in 100 cases found the abscess

in the cerebrum	62 times
" " cerebellum	32 "
" " cerebrum and cerebellum	6 "

These abscesses are found more frequently on the right than on the left side (Körner,⁴ Meyer,⁵ Huguenin,⁶ Robin,⁷ Schwartze⁸). According to Körner,⁹ who is supported by the anatomical studies of Bezold and Rüdinger,¹⁰ the tegmen tympani is thinner on the right than on the left side in 77 per cent. of cases, and therefore morbid processes on the right side extend more readily into the cranial cavity than those on the left, and the dura with its blood and lymph vessels is more readily affected even when the bone is healthy.

In 100 cases, Körner found 62 in the cerebrum, 32 in the cerebellum, and 6 in both,

¹ *Diseases of the Nervous System*, vol. ii.

² *Brit. Med. Jour.*, 1887, vol. i., p. 723.

³ *Arch. f. Ohrenheilk.*, vol. xxix.

⁴ *Arch. f. Ohrenheilk.*, vol. xxvii.

⁵ *Arch. f. Ohrenh.*, vol. xxvii.

⁶ *Pathology of Cerebral Abscess*. Zurich, 1867.

⁷ *Ziemssen's Handbook*, vol. xi., p. 661.

⁸ *Des Affections Cérébrales Conséc.*, etc., 1883.

⁹ *Surgical Diseases of the Ear*, 1885, p. 403.

¹⁰ *Monatssch. f. Ohrenheilk.*, vol. vii, No. 11.

	in cerebrum	in cerebellum	in both
right	34 = 55.5 %	21 = 65.6 %	4 = 66.6 %
left	26 = 41.3 %	10 = 31.3 %	2 = 3.33 %
In both hemispheres of cerebrum 2 = 3.2 %, of cerebellum 1 = 3.1 %.			

These statistics, like those of other authors, show that otitic brain abscesses are found twice as frequently in the cerebrum as in the cerebellum. Cerebral abscesses are most frequently found in the temporal lobes, less frequently in the frontal, rarely in the occipital, and in very exceptional cases in the parietal lobes. The comparative statistics as to the relative frequency of abscesses in the temporal lobes show a marked difference in Barr's and in Körner's tables. The former found 72.3 %, the latter 37.3 %.

Otitic abscesses occur in males twice as often as in females. Körner in 62 abscesses of the cerebrum, 43 in males and 19 in females; in 32 abscesses of the cerebellum, 20 in males and 12 in females.

Abscesses are observed at every age, rarely, however, under ten years, and mostly between the ages of twenty and thirty. Hartmann explains their rarity in infancy by the fact that the posterior fossa is farther distant from the tympanic cavity in infants than it is in adults, and therefore a disease originating in the mastoid or in the tympanic cavity does not extend so readily to the posterior fossa.

The most frequent cause of otitic brain abscess is chronic purulent otitis media, and particularly caries of the mastoid consecutive to this. A brain abscess may develop, however, without preceding caries of the bone.

Such cases, and in general those in which the dura is not affected, are very rare. The bone and dura are found diseased in 64.8 per cent. of cerebral abscesses, in 73.3 per cent. of cerebellar abscesses, and in 83.3 per cent. of the cases in which there are abscesses both in the cerebrum and in the cerebellum. The exciting causes of otitic brain abscess, when the affections mentioned above exist, are exposure to cold, injuries, and retention of pus in the middle ear from any cause whatever. In rare cases brain abscess

follows mastoid operations (v. Bergmann). Brain abscesses usually develop after the aural disease has lasted a long time. There are cases, however, in which only some weeks or months elapse between the appearance of the aural disease and the development of the abscess.

The abscess is usually found on the side of the diseased ear. In many cases it is separated from the temporal bone by a more or less thick layer of healthy brain substance. In a greater number of cases there is a direct communication between the pus in the bone and that in the abscess. Healthy brain substance between bone and abscess was found by Körner 10 times in 90 cases; by Robin 14 times in 67 cases. Körner found a communication between the abscess and the bone 20 times; in 7 the abscess was separated from the bone by the dura alone; in 12 the brain substance was adherent to the meninges over the diseased bone; in 8 the brain substance between the bone and the abscess was softened. In rarer cases the abscess is found on the opposite side (v. Troeltsch, Magnus, Robin). I believe that the diminishing frequency of these cases and a study of the earlier histories make it seem doubtful whether they are really cases of otitic brain abscess.

The true otitic abscess is usually single, but may be multiple. Körner in 100 cases found an abscess in the cerebrum and a second in the cerebellum 6 times. In 62 cases of abscess of the temporal lobe this was double 6 times, and in 32 cases of cerebellar abscess it was multiple in 4 cases.

The formation of an abscess at some distance from the purulent disease is caused by the transference of septic material containing pathogenic microbes. Sluggishness of the circulation in the sinus allows this septic material to reach the brain through the veins which run from the ear to the brain and carry their blood into the sinus (Adams). The perivascular lymph sheaths may also carry the infection (Gowers). Biswanger believes that the principal channels of transmission are the perivascular sheaths of the branches of the carotid which spread out in the tympanic cavity. A serious objection to this hypothesis is the fact that abscess of the frontal lobes is exceedingly rare.

Toynbee was the first to observe that diseases of the tympanum cause cerebral abscesses for the most part, and diseases of the mastoid chiefly cerebellar abscesses. This is explained by the fact that the tegmen tympani forms a portion of the middle cerebral fossa in which the temporal lobe rests, and the bone which separates the mastoid cells from the cranial cavity forms a portion of the posterior fossa in which the lobes of the cerebellum lie.

Suppuration in the brain is the result of an inflammation, and the first stage of the abscess is probably the "red softening." The pus has a greenish color, is thinly fluid, mixed for the most part with fibrinous masses, and its reaction is usually acid. After the abscess has lasted for a time the capsule forms about it, at first very thin but gradually becoming thicker and denser. Its inner surface is smooth and consists of connective-tissue elements. The neighboring brain substance is often softened by a slight œdema, and immediately about the capsule it may undergo fatty degeneration. The capsule offers no obstacle to the enlargement of the abscess, and if there is a canal, permitting some escape of pus, there may be an excessive secretion. In half the cases there is no capsule. In cerebral abscesses Körner found a capsule 16 times, and 17 times none. In cerebellar abscesses it was found 12 times and was wanting 8. The capsule generally appears about the second month, but may appear later. The abscess may be entirely encapsulated, or it may have a fistula opening into a ventricle or externally. The fresh abscess is usually irregular in form, the encapsulated abscess round or oval.

An encapsulated abscess may remain stationary, and its capsule become thicker, and capsule or contents become calcified.¹ More frequently the abscess enlarges and causes death by interfering with vital functions or by rupturing and causing inflammation.

Brain abscess not of otitic origin, may empty into the tympanic cavity and thus cause a secondary otorrhœa (Itard, Rokitsky, MacLeod, Berndgen, Odenius, and others).

¹ Fenman, *Edinburgh Med. Jour.*, Oct., 1879.

Such cases, however, are rare. Brain abscesses are rare after acute inflammations of the middle ear (Lebert, Farwick, Horsley-Ferrier, Schmidt, Baginsky, Gluck), and mostly develop in the course of chronic otorrhœa.

In every brain abscess three stages must be distinguished :
1. The *inflammatory*, lasting a varying period from some days to two weeks, characterized by the general symptoms of an acute encephalitis, or, as is more common, it begins with vague symptoms not distinguishable from those of the purulent otitis. For this reason it is difficult to fix exactly the beginning of the abscess. 2. The *latent* stage which lasts from a few weeks to a year or two, and in exceptional cases as long as twenty-five years. It is rare, however, that there are not some symptoms present which would point to cerebral disease. Usually there are headache, mental depression, convulsions, etc. 3. The *terminal* period, corresponding to the enlargement of the abscess. This may last from a few days to a couple of months. In rare cases death is due to an accidental disease of some other organ.

In describing the symptoms of otitic brain abscess I shall follow Bergmann's classification. He divides the symptoms into 3 groups. 1. symptoms depending upon the suppuration; 2. symptoms depending upon increased intracranial pressure; and 3, focal symptoms varying with the location of the abscess.

The symptoms of the first group are not characteristic, being found with any suppuration. The first of these is fever. It is often intermittent, and may be wanting altogether. It appears chiefly in the terminal stage, coming on with a chill and ending with a profuse perspiration. This may be mistaken for malaria. The temperature is usually not high. The fever may last one day or several days.

Besides fever there is debility and general depression. The patient suffers from pain in the stomach, loss of appetite, swelling of the abdomen, constipation, nausea and vomiting. *The last is said to be found particularly with cerebellar abscesses*; this I cannot confirm as I found it in all my cases. The tongue is dry and brown, or bluish, and is tremulous. The patient becomes rapidly emaciated in

consequence of the suppuration and the diminished nutrition. All these symptoms, however, are frequently found with suppurative processes in the middle ear and in the mastoid, particularly when there is retention of pus.

The first group of symptoms is almost without exception accompanied by symptoms of the second group. The principal symptom of this category is headache. This occurs with abscesses as well as with tumors, and has the same character in each. At times the headache is slight, the patient complaining of heaviness and dulness; at other times it is very severe. Muscular exertion, pressure on the head, the use of alcohol, a low position of the head, anything in fact that increases the cerebral blood pressure, aggravates the headache. The headache is usually fixed, and corresponds to the location of the abscess; but this is not always the case and the seat of pain may shift daily, or the pain may be generally distributed over the entire head. There are also cases which run their course without headache. The headache usually is more severe during the febrile attacks. Percussion over the abscess increases the pain. This experiment is only of value when it is not performed in the neighborhood of the mastoid, for in the latter case the pain may come from a collection of pus between bone and dura, or in the mastoid or middle ear rather than from an abscess in the brain (Bergmann). Schwartze believes that in cerebellar abscess there is constant pain in the occipital region. Körner, however, found occipital pain only 8 times in 21 cerebellar abscesses; 3 times there was frontal pain with cerebellar abscess, and 5 times there was occipital pain with abscess of the temporal lobe.

Vertigo is a frequent symptom, occurring usually with changes of posture. The vertigo increases usually in intensity when the headache is more severe. It is found equally in cerebral and in cerebellar abscess. The patients often appear intoxicated. The vertigo is accompanied by tinnitus. In some cases it is so severe that patients become almost unconscious. Others wander about aimlessly, do not reply to questions, etc. The giddiness may also be the result of a simultaneous labyrinthine affection.

The pulse is reduced in frequency to 50, 40, or even 30, toward the end of the disease, or perhaps in its entire course. Often the slowing of the pulse becomes more marked as the abscess increases in size. Slowing of the pulse, when there is fever, severe headache, and somnolence is very indicative of brain abscess. Optic neuritis is not frequent in otitic brain abscess.

The third group are the *focal* symptoms. Unfortunately they are not so frequent nor do they appear so early as might be desired. They only appear when the abscess is in the neighborhood of the motor region or in the gray substance. They are almost entirely wanting when the abscess is localized in the white substance of the frontal, temporal, or occipital lobes. The focal symptoms depend upon the degree of destruction or softening of the brain substance. A collection of pus in the white substance interferes with conduction without abolishing it.

Convulsions are a frequent focal symptom of otitic brain abscess. They have the character of epileptic or apoplectic attacks. They appear at the beginning and at the end of the terminal stage. They are mostly accompanied by paralysees of the same side. If the abscess ruptures and causes purulent meningitis in the region of the pons or the medulla, there will be rigidity of the occipital region and slight opisthotonus.

Paralysees, chiefly hemiplegic, are found in about half the cases. Usually they are not complete. Frequently they follow unilateral convulsions. If the abscess has invaded the gray substance or impinged upon the motor tracts, the paralysees are marked and are limited usually to one arm with or without implication of the face. With hemiplegia, the sensibility is diminished, otherwise it is normal or increased. The sensibility is markedly diminished in abscess of the optic thalamus, of the posterior portion of the hemispheres, or of the cerebellum with pressure on the pons. The cranial nerves are often involved. Paralysis of the facial and auditory nerves is due to disease of the temporal bone; it is always found on the side of the affected ear, and is usually not complete. In the terminal stage

paralyses of the opposite side may develop. The speech is often slow, but articulation and deglutition are only markedly affected when the abscess is in the neighborhood of the pons.

Photophobia is not rare; it increases usually with the increase in the headache. The pupils are usually irregular and unequal in size. In the last stage the pupillary reaction is sluggish or entirely absent. Ptosis is often found on the side corresponding to the abscess; at times also paralysis of ocular muscles. In cerebellar abscesses when there is pressure on the pons, the motion of the eyes may be restricted in a particular direction. Hemianopia and nystagmus are often observed.

Psychical disturbances are frequent. Mental disturbances are of varying degree, from a slight weakness of the intellect to marked symptoms of mania and delirium. The character of the patient changes without any appreciable cause; he becomes depressed and reserved, the memory is weak, and the patient loses his ability to work. Later there is hypochondria, and sometimes there is a tendency to suicide. All these symptoms may be of long duration and give the picture of a mental affection, and such patients have often been confined in insane asylums. In the terminal stage often a soporose or comatose condition develops. These symptoms cause death directly or they appear by paroxysms and eventually lead to a fatal termination.

All these symptoms present two chief characteristics viz.: they rarely occur isolated, and they usually show paroxysms of varying duration. The remissions are often very long and years may elapse between the initial and the terminal stage. Each attack is more severe than the preceding one. The paroxysmal attacks depend on the sudden increase in the intra-cranial pressure or on circulatory disturbances in the neighborhood of the abscess. When nervous symptoms appear, the course of the disease is, as a rule, more rapid. Gowers (*l.c.*) states that, in the cases which he has collected, the terminal period in one fourth of the cases was less than five days, in one third of the cases less than ten days, and in seven eighths not longer than a month.

Whatever may be the nature of the symptoms, whether constant or paroxysmal, the disease ends always with the rupture of the abscess into a lateral ventricle or more rarely on the surface. The escaped pus kills the patient suddenly, simulating thus an apoplexy, or a severe meningitis develops, which causes death in a short time. There are also cases in which the patient dies suddenly without rupture of the abscess. In such cases death is due to the sudden compression of vital centres in the brain.

The *lack of constancy* in the local symptoms, their *similarity to the symptoms of other less dangerous diseases*, such, for example, as simple purulent inflammation of the middle ear, and the long *periods of intermission*, make the diagnosis difficult or impossible. It may be said that there is scarcely a brain disease of like severity that is so often overlooked. The diagnosis is often rendered more difficult by the intracranial complications which are present at the same time and have their own complex of symptoms. Robin who collected 200 cases of caries of the temporal bone and of other aural diseases, found 70 pure cases where only one brain affection was present; 55 with cerebral abscess and meningitis; 20 with cerebral abscess, phlebitis, and meningitis; 3 with cerebral abscess and phlebitis; 1 with abscess of cerebrum and cerebellum, phlebitis and meningitis; 22 with cerebral abscess; 4 with cerebellar abscess. In the remaining cases there was no brain abscess. From this we see that for 26 cases of pure otitic brain abscess there were 79 cases in which there were intracranial complications. Körner found the brain abscess most frequently complicated with phlebothrombosis of the transverse sinus. *In three fourths of the cases of otitic brain abscess the course is such that a diagnosis can be made.* The careful weighing of all the symptoms, the localization of the bony affection, the ætiological elements, and the length of time the patient has been under observation, if carefully considered, enable us not only to diagnose the abscess but often to localize it.

Otitic brain abscess may be confounded with collections of pus between dura and bone, meningitis, acute purulent otitis media, thrombo-phlebitis, general infection, apoplexy, brain

tumors, functional disturbances of the brain, and with intermittent fever.

The collections of pus between the dura and bone, the so-called pachymeningitis externa suppurativa circumscripta, arise in the same manner as brain abscess, principally from the retention of pus in the middle ear. The pachymeningitis suppurativa is distinguished from the brain abscess by the fact that with the former there are no symptoms of increased intracranial pressure. In pachymeningitis, moreover, there are local changes in the bone, such as fistulæ which lead directly into the cranial cavity. If both diseases are present together, the diagnosis is often impossible.

A meningitis may be confounded with an abscess, as the former often occurs in the terminal stages of abscess, and as both diseases may arise from the same cause. In abscess the prodromal symptoms are usually of longer duration; meningitis affects the cranial nerves more extensively. An abscess in the pons may affect a number of nerves, but it is of extreme rarity. The meningitis of the terminal stage of abscess is purulent, and has a much more rapid course than primary meningitis. The diagnosis of the latter is frequently supported by the previous brain symptoms which differ in the two diseases. Much depends on the time when the patient is first seen, and the length of time that he remains under observation. If we see the patient for the first time when the symptoms of abscess are partly masked by those of meningitis, a longer period of observation is required in order to make a correct diagnosis. Many patients, however, die before the diagnosis is made. If an abscess ruptures into a lateral ventricle or on the surface, and an aural supuration has previously existed, the sudden and severe symptoms can be understood.

The differentiation of an otitic brain abscess from an otitis media suppurativa is often difficult, as many general brain symptoms may be produced by an otitis. In suppurative otitis, among other symptoms, optic neuritis and paralysis of the extremities may be observed. I believe that the difficulty in diagnosis is not because an aural supuration runs a course simulating that of brain abscess, but

that brain abscess in some stages may not reveal itself, and may show only such symptoms as may be attributed to the existing aural inflammation.

Thrombo-phlebitis of the sinuses, from which usually a general infection arises, as well as general infections of other sorts, as typhus, etc., may sometimes be mistaken for brain abscess. This is hardly possible in uncomplicated abscess. The pulse, the character and the localization of the headache, the fever, the paroxysmal character of the symptoms of abscess, the general condition, and the focal symptoms prevent error.

The distinction between an apoplectic attack and the rapid terminal stage of abscess is not difficult when there has been or is suppuration of the ear.

Brain abscess may be distinguished from brain tumor by attention to the following points: In abscess a causative element may always be found. The absence of such speaks in favor of tumor. Marked focal symptoms, slow course, particularly when there is progressive paralysis of the cranial nerves, and an intense optic neuritis, favor the diagnosis of neoplasm. The rapid development of severe brain symptoms coming on after symptoms of a mild brain affection favors the diagnosis of abscess, particularly when there are chills and fever. Both abscess and neoplasm, however, may develop simultaneously.

Functional brain disturbances can only be confounded with abscess when the latent stage shows only convulsions and psychical disturbances. If there is another characteristic symptom, such as optic neuritis, slowing of the pulse, or headache, the error is easily avoided.

The intermittent character of the fever in brain abscess, which often begins with a chill and ends with a perspiration, may cause a wrong diagnosis in a very early stage of abscess. The appearance of other characteristic symptoms clears up the diagnosis.

The localization of a brain abscess is often exceedingly difficult. In the first place we must distinguish between cerebral and cerebellar abscess. For cerebellar abscess the characteristic symptoms are disturbances of co-ordination,

such as uncertain gait and excessive vertigo, but these symptoms are rarely found, and they occur also in other diseases of the central nervous system. The location of the headache is of some importance. The portion of the bone which is diseased may be of some assistance. But if both the mastoid and the tegmen are involved, or if both tympanic cavities are affected, as is often the case, we get little information as to the location of the abscess. The various disturbances in the motor and sensory cerebral and spinal nerves have no diagnostic value. A complete paralysis of one facial nerve, however, may point to an abscess in the same side of the cerebrum. McBride and Miller¹ found a labyrinthine affection in 4 cases of cerebellar abscess, and no labyrinthine affection in 15 cases of cerebral abscess, from which they concluded that in doubtful cases the absence of bone-conduction would indicate cerebellar abscess. This symptom is not constant, however. Körner in his cases found bone-conduction wanting nine times in cerebral abscess, and present in nine cerebellar abscesses. Disturbances of speech occur only in cerebral abscess, but they are rare.

From what has been said it will be seen how difficult it may be to differentiate between cerebral and cerebellar abscess. The exact localization of a cerebral abscess is a still more difficult matter. The centrum ovale, according to previous experience, gives no focal symptoms,² so that large abscesses may develop in any of the cerebral lobes without causing any symptoms. Only when the abscess reaches the internal capsule or the gray substance, and these parts are compressed or irritated, do focal symptoms appear. Experience shows that the greater number of otitic brain abscesses are localized in the temporal lobes, and this point should be considered in making a differential diagnosis. A considerable portion of the frontal lobe may be destroyed without exciting the least suspicion that so serious a con-

¹ *Edinburgh Med. Journ.*, 1887, May and June.

² Disturbances of speech have been described with foci in the medullary layer by Kussmaul, Pitres, and Wernicke, but it seems that in these cases the gray substance was also involved (Nothnagel, *Topische Diagnostik der Gehirn Krankheiten*, p. 357).

dition exists. The nearer the abscess approaches the posterior segment of the frontal convolutions, the more frequently we find conjugate deviation of the eyes, disturbances of speech, and from irritation of the left third frontal convolution, ataxic aphasia. With abscess in the occipital lobe hemianopia is often found.

Multiple abscess cannot be diagnosticated. Usually only one is recognized.

The prognosis of otitic brain abscess until recently was bad, every case terminating fatally. There were a few cases reported in which the abscess became calcareous or cicatricial and the disease did not advance for years, but these cases are very exceptional. Only since cases have been operated, has the prognosis improved. It is to be hoped that when the diagnosis becomes more certain, and the method of operating improved, the prognosis will be much better.

In the present state of our knowledge there is but one indication to be fulfilled, viz., to permit the escape of pus from the brain. The operation should be undertaken only when the diagnosis is sure or nearly so, and never in my opinion in doubtful cases. Bergmann rightly says: "We are not to blame for being unable to recognize every abscess in the cerebrum or cerebellum, but we are to blame in leaving unopened an abscess which has been clinically diagnosticated with certainty."

As early as 1854 Victor v. Bruns gave classic indications for opening the cranial cavity, which even to-day, after the introduction of antiseptics, are rational, and the only correct indications for the operation of otitic brain abscesses. According to Bruns the operation shall not be done, (1) unless there are symptoms present which make us reasonably sure of the existence of an abscess and fairly certain as to its location; (2) when we are quite sure of the existence of an abscess and of its location, the operation should always be done; (3) when the diagnosis is uncertain there is slight chance of a favorable result. In the latter cases the opening of the skull must not always be refused, nor always performed. If the diagnosis is once sure, the operation should be done

at once, for the abscess may burst unexpectedly or cause sudden compression of vital parts, so that a few hours' delay may lose the patient's life. Bergmann has reported such cases, and I have twice seen them.

The number of cases of operation for otitic brain abscess which have been reported, including my own, is 32; in 17 the result was good, in 15 fatal. The cases of the first category are as follows: 1 by Moraud (1751) and 1 by Le Roux (1844).¹ Of later years the first successful operation was by Schede-Truckenbrod (1885)²; 2 by Barker (1886 and 1888);³ 1 by Bergmann (1888)⁴; 2 by MacEwen (1887 and 1888)⁵; 1 by Horsley-Ferrier (1888)⁶; 1 by Greenfield (1887)⁷; 1 by Schwartze (1886)⁸; 2 by Pritchard (1890)⁹; 1 by Gluck-Baginsky (1891)¹⁰; 1 by Sick (1890)¹¹; 1 by Hoffmann (1890)¹²; 1 by Truckenbrod (1891).¹³

The cases ending fatally are as follows: 2 operated by Bergmann, 1 by MacEwen, 1 by Hutton-Wright, 1 by Weir, 2 by Schwartze, 1 by Piqué, 2 by Gluck, 1 by Jansen, 1 by Arbuthnot Lane, 2 by Truckenbrod, and 1 by myself.¹⁴ The number of fatal cases is probably greater, but these are all that have been reported.

Chauvel and Bergmann have indicated the point where the skull should be opened. Chauvel believes that the temporal lobe is best reached through an opening just above the external auditory canal. This corresponds to the centre of the region indicated by Bergmann. The region within

¹ *Arch. f. Ohrenh.*, vol. xxix., p. 161.

² *ARCH. OF OTOTOLOGY*, 1886.

³ *Brit. Med. Jour.*, Dec. 11, 1886, and vol. i., p. 777, 1888.

⁴ *The Surgical Treatment of Brain Diseases*, 1889, p. 59.

⁵ *The Lancet*, vol. i., p. 616, 1887; and *Brit. Med. Jour.*, vol. ii., p. 310, 1888.

⁶ *Brit. Med. Jour.*, vol. i., pp. 530 and 636, 1888.

⁷ *Ibid.*, No. 1363, p. 317, 1887.

⁸ *Arch. f. Ohrenheilk.*, vol. xxix., p. 163.

⁹ *ARCH. OF OTOL.*, Nos. 2 and 3, 1890.

¹⁰ *Berlin. klin. Wochenschr.*, No. 48; 1891.

¹¹ *Deutsche med. Wochenschr.*, 1890, p. 186.

¹² *Ibid.*, 1890, p. 1082.

¹³ *ARCH. OF OTOL.*, ii., 1892.

¹⁴ These cases are mostly published with the favorable ones. Piqué's case is in the *Annales des Mal. de l'Oreille*, etc., 1890, vii., p. 437; Jansen's in *Berliner klin. Wochenschr.*, No. xlix., 1891.

which Bergmann operates is bounded about by the upper margin of the temporal suture. This corresponds in location to the fissure of Sylvius, above which one should not go. The upper limit is given by a line parallel to the zygoma and about 5 *cm* above it. The lower boundary of the trephine opening must be at least 1 *cm* from the root of the zygoma above the external auditory canal. The posterior boundary is a perpendicular to the line joining the lower orbital margin and the occipital protuberance, erected at the posterior margin of the mastoid. The anterior boundary is formed by a second perpendicular through the articulation of the lower jaw. This region includes the extreme limits within which the skull should be trephined. In operating for cerebellar abscess, Bergmann advises placing the centre of the opening on the posterior boundary, making a large cutaneous and periosteal flap with its convexity extending downward to the outer surface of the mastoid. In this way we expose the postero-inferior angle of the parietal bone and its articulation with the temporal and occipital bones, and also the large emissary vein, all of which are of localizing value. The English surgeons confine themselves for the most part within the limits given by Bergmann; some, however, make a second opening farther back in order to give the pus a better exit. The study of a number of skulls has convinced me that, in abscess of the temporal lobe, it is better to make the trephine opening farther forward, at Bergmann's anterior limit, in order to avoid a possible wounding of the transverse sinus, which is not of great importance, but is sometimes an unpleasant complication. In many cases, however, the opening of the sinus is indicated, as the exposure and antiseptic treatment of the dura may favorably influence an existing inflammation, and prevent its spreading farther (Hoffmann). According to Schwartze, in cerebellar abscess the mastoid antrum should first be opened if this has not been already done, and then a second opening made farther backward and higher up. The direct opening of a brain abscess through the roof of the mastoid, as first done by Truckenbrod, has the advantage that it allows free escape of the pus and does not

injure the cranial wall. Further experience is necessary before the value of this method can be definitely ascertained.

The trephine opening should be at least 3 *cm* square. A very large opening in the bone and in the dura may be dangerous, as a fatal œdema may follow a venous hyperæmia. German surgeons use the chisel and hammer; English, the trephine. I believe that the trephine causes less shock than the hammer.

After making the wound in the bone, the condition of the dura is of importance and should be noted. If it is tense, as is often seen when there is an abscess, no pulsation will be felt. There are, however, many exceptions to this rule, and therefore the existence of pulsation should not cause the surgeon to hesitate about continuing the operation.

A long cut is made in the dura, and the knife is then passed directly into the brain. Often an aspiration needle is first passed in and if pus is found the wound is enlarged. It has happened a number of times that the aspiration needle, after being thrust in several times, has failed to find pus in cases where an abscess was found at the autopsy (Bergmann, Schönborn, Kappeler). Aspiration is not an altogether innocent procedure. Beck saw hemorrhage into the lateral and the fourth ventricle follow it.

The brain wound is enlarged by forceps and after the escape of the pus a sufficiently large hard drainage-tube is inserted, which should not press on the abscess wall. The wound is then washed out and the cavity filled loosely with iodoform gauze. The experiments of Fauvel, Wagner, and Bergmann, in leaving the button of bone beneath the skin flap, have not been always successful, since the bone becomes necrotic.¹ The wound usually heals in from two and a half to six weeks.

If after opening the abscess a thick and irregular capsule is found which might cause the stagnation of the pus, Bergmann advises its removal.

If the abscess is not entirely emptied, or if a second one is present, the increased intracranial pressure may force the

¹ Truckenbrod, *Arch. of Ophth.*, 1892.

brain through the trephine wound, and the meningo-encephalitis which usually soon comes on in such cases may cause necrosis. In cases of brain prolapse the retained pus should be removed and active antiphlogistic treatment instituted.

Hemorrhage in the course of the operation, coming from the brain substance, pia mater, sinus, or bone, is usually not alarming and is readily checked with tampons of iodoform gauze. When the middle meningeal artery has been cut, compression is often all that is needed, but if this is not successful, the bone must be farther removed and the artery tied, a task not always easy to perform.

When the wound is infected in the course of the operation or afterwards, death quickly follows from meningitis, encephalitis, or thrombosis and pyæmia.

After the healing of an otitic brain abscess, we may have headache (Barker), aphasic disturbances (Schede), or later epilepsy. These symptoms result from the destruction of a portion of the brain by the abscess, or from the changes about the cicatrix formed.

As the greater number of otitic brain abscesses are the result of an affection of the bone, the mastoid should be opened, or carious and necrotic bone in the tegmen tympani should be removed according to Küster's¹ or Stucke's² method, before the abscess is attacked directly, except in exceptional cases, when a sudden lethal ending may be feared.

An important point is the prophylaxis of otitic brain abscesses. An early and a rational treatment of the primary aural affection will often prevent the formation of an abscess.

Internal medication is useless in cases of otitic brain abscess. When the diagnosis is once positive, there is nothing to be done except to remove the pus.

¹ *Deutsche med. Wochens.*, Nos. 12 and 13, 1889.

² *Arch. f. Ohrenh.*, vol. xxxii.

HISTOLOGY OF TWO PETROUS BONES OF A
GIRL COMPLETELY DEAF FROM SCARLET
FEVER: DIED OF PURULENT MENINGITIS.

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Translated by Dr. C. ZIMMERMANN, Milwaukee, Wis.

(*With Plates I. and II. of vol. xxiii, German Edition.*)

IN order to complete my former communications on the changes in the petrous bone following recent cases of diphtheria, I shall describe two specimens, in which the aural disease had run its course for a long time. They were taken from a girl of twelve years, who died of purulent meningitis, having lost her hearing completely after scarlet fever and diphtheria three years previously. Drs. Doering and Wein-kauff kindly furnished the clinical notes.

In May, 1886, the child, perfectly healthy before, fell sick with scarlet fever and diphtheria of the naso-pharynx. On the fourth day acute purulent otitis media of both ears set in. She could hear only very loud noises, and even these faintly; suffered from vertigo and staggering gait. The child complained of constant earache for a long time afterwards and frequently of headache, especially during the night. In January, 1889, she had measles, after which the discharge from both ears became more copious. January 15, 1889, the child was taken into the eye-clinic at Heidelberg on account of membranous conjunctivitis of left eye. Temp. 39.8° . Besides she had diffuse bronchitis, painful and swollen submaxillary glands, headache, and pain in the abdomen. The purulent offensive secretion ceased in the right ear after a few days, in the left on January 21st, simultaneously with the fall of temperature to 38° , which had been continuously from 39° to

40°, and then wavering between 38° and 39° until January 27th, when it rose to 40.4°. At the same time the left ear discharged pus again until death, the right only for one day. The temperature, being about 39°, rose shortly before death to 40°. There was complete deafness for voice, and somnolence, from the first days. At first there was constipation; after a while she had screaming spells during sleep, continually grasping her head, vomiting, and grinding her teeth; left-sided hemiplegia, convulsions of the facial muscles, clonus of the muscles of the neck, retention of urine, spontaneous defæcation, abolition of the tendon and skin reflexes after preceding general hyperæsthesia, very marked clonus of left foot, increasing somnolence; death, January 29th, without special premonitory symptoms. The nose discharged brownish pus since January 28th. Abdomen soft but retracted. The ears were syringed three times a day with a solution of boric acid. The pulse, at first 100-120, irregular, was 80-100 simultaneously with the low temperature; in the last days of her life 140-160; respiration, which had been accelerated, was 12. Cheyne-Stokes phenomenon only transitory.

Clinical Diagnosis: Meningitis, conjunctivitis membranacea; bronchitis diffusa; otitis media purulenta duplex.

Post-Mortem Examination by Dr. Ernst, Jan. 30, 1889: Purulent meningitis (of convexity and base); hydrocephalus internus; cheesy glands at right bronchus. Disseminated tuberculosis of both lungs. Numerous cheesy conglomerated tubercles of the spleen and kidneys. tubercles of the liver.

MACROSCOPIC EXAMINATION OF BOTH PETROUS BONES
BEFORE THE TREATMENT WITH OSMIC ACID AND
DECALCINATION WITH CHROMIC AND NITRIC ACID.

Bony roof of both tympanic cavities very sclerotic, its mucous membrane thick and red. *Right* petrous bone: inspissated secretion on the walls of the osseous meatus. *Mt* destroyed as far as its periphery; hammer and anvil missing; stapes movable, but less than normal. Bony tube very narrow. Mucous membrane of the labyrinth wall grayish white; of the antrum pink, slightly thickened. The sloping portion of the tympanic cavity covered with pus.

Left petrous bone: In external meatus and tympanic cavity much liquid pus. Hammer and anvil wanting, stapes movable. Mucous membrane of the very narrow tube and of the antrum considerably reddened. *Mt* destroyed to its margin. From its lower border starts a cicatricial formation covering the whole labyrinth wall, which a later examination reveals to be epidermis "immigrated" from (originating in) the *Mt*.

MICROSCOPIC CONDITION OF THE MIDDLE EAR. THE
RIGHT LABYRINTH WALL.

In some sections the foot-plate of the stapes was displaced laterally and its place filled by dense connective tissue growing from its inner surface, its hyperplastic interior periosteum being detached. To the right and left of this tissue were signs of recent inflammation. A broad dense band of connective tissue expanded over the entrance to the niche of the fenestra rotunda, very likely dating from the time of the scarlatinous otitis, not showing the fibrillar structure of the pseudo-ligaments, frequently met with as a product of the regressive changes of the mucous membrane of the labyrinth wall.

The epithelium of the niches of both fenestræ was destroyed by the terminal purulent otitis. The niches were filled partly with small and large celled granulation tissue, partly with pus cells, and in a lateral direction with a large quantity of polymorphous granular cells, stained black by osmic acid. *Normal epithelium* was found only in the mucous membrane between the entrance to the fenestra rotunda and the floor of the drum. The rest was *devoid of epithelium and of any cell-infiltration*. Epidermis connected the lower periphery of the *Mt* with the centre of the labyrinth wall. From there upwards to the semicanal for the tensor tympani the whole mucous membrane, except the lining of the niches, had become epidermoidal, and the entrance to both niches was bridged over by epidermis. The more minute conditions may be brought into two categories.

(1) Stratified, mostly cornified lamellæ of epidermis with rete Malpighii and papillæ in the same arrangement as in the external meatus.

(2) This was especially the case with the bridge between the facial wall and the head of the stapes: epithelial cells encapsuled in concentric lamellæ of horny epidermis; the whole bridge consists mostly of such microscopical cholesteatomata (Fig. 5).

SPECIAL CONDITIONS.—CYSTS.

In the mucous membrane of the labyrinth wall, 3 *mm* below the canal for the tensor tympani, was an oval cyst 1.5 *mm* long, 1 *mm* wide; its medial wall borders on the periosteum of the labyrinth, the periosteum of several sequestra being attached to its lateral wall. The contents of the cyst consist of colloid tissue and elements like amœboid cells, very different from each other and mostly fatty degenerated. The interior wall is lined with low cylindrical epithelium. Another cyst of the same contents and epithelium was seated in the niche of the fenestra rotunda, 2 *mm* long, 1 *mm* wide.

MICROSCOPICAL CONDITION OF THE LEFT MIDDLE EAR.

An epidermis bridge, 2 *mm* long, passes from the lower border of the destroyed remnant of the *Mt* to the floor of the tympanum, and forms an arch towards the labyrinth wall. Covering the latter and bridging over the niches of the fenestræ it terminates above the lateral wall of the facial canal. The mucous membrane was destroyed down to the periosteum on 2 points from 2-3 *mm* in length. On some places of this bridge were epidermis-cells, stained black by osmic acid, apparently shed off and in a state of fatty degeneration. No signs of epidermoidal transformation, wherever the mucous membrane was destroyed. A wave-like formation of rete Malpighii projecting into the mucous membrane was found on the cochlear capsule under a thin stratum of epidermis. *Thus we have epidermoidal and "immigrated" epidermis next to each other on a relatively small area of the labyrinth wall.* The mucous membrane,

as far as preserved, showed a twofold condition, viz.: purulent infiltration in both niches of the labyrinth wall from the fenestra rotunda downwards to the floor of the drum, but no trace of vascularization or cell infiltration above the niche of the fenestra ovalis; an infiltration of black granules and polymorphous and black granular cells. Below the canal for the tensor tympani and on the foot-plate of the stapes they were densely crowded in an oval area of 1-2 mm in diameter.

Atrophy of the mucous membrane of the labyrinth wall.

In several hæmatoxylin-preparations some portions of the mucous membrane appeared lighter. They consisted of very light and very fine connective-tissue fibres as the result of a healed necrosis of the mucous membrane (from the scarlatina otitis).

Both intrinsic muscles of both sides.

The fibres of the tensor tympani were partly waxy, partly transformed into connective tissue, only very few normal left. The stapedius was totally replaced by connective tissue.

Recent osteo-necrosis in the middle ear: The osseous portion towards the niche of the fenestra ovalis showed fresh necrosis as far as to the horizontal wall of the ampulla and the medial wall of the facial canal, 3 mm in medial direction. The periosteum of the canal was detached, the neurilemma destroyed; $\frac{2}{3}$ of the nerve were green, $\frac{1}{3}$ showed osmium-staining without histological changes. In some sections of the petrous bones the necrosis at the surface and in the centre was healed. Fig. 4 shows both conditions, fig. 1 at *knk* only a central necrosis. The surface of the bone shows (in Fig. 4) more or less large lacunæ of connective tissue and large accumulations of granular cells between its meshes in the destroyed area. In the deeper layer of the hypertrophied mucous membrane sequestra are imbedded (Fig. 4) at *sq*. The healed central necroses (*gckn*) consisted of osteoid tissue, stained yellow by picrocarmin, and of connective tissue with only a few, but well-developed bone corpuscles. Habermann saw such healed necroses in purulent otitis media, after it had run its course.¹

¹ *Zeitschr. für Heilk.*, vol. xii.

CHANGES IN THE RIGHT LABYRINTH.

The auditory nerve is imbedded in pus from the porus acusticus internus to the fundus, partly infiltrated with blood, its fibres mostly destroyed. Of the vessels only remnants with their thickened walls are left. The facial nerve shows the same condition, though less pronounced. The ganglion geniculi is partly destroyed by ulceration, its cells intact. The suppuration reaches as far as the second bend of the nerve; the lateral wall of the Fallopian canal shows some defects of ossification. The nervus vestibuli and sacculi surrounded by pus. It is remarkable that the nerves, not destroyed by pus, were not stained by osmic acid, the two portions of the facial, described above, showing this different reaction very strikingly. The cochlea with its endosteum near the scala tympani is entirely destroyed, only the superficial layer of the spiral ligament is still preserved, but its osseous border half missing. The necrotic canal is partly filled with bone detritus, which scarcely contains any bone corpuscles. The modiolus to the cupula and the lamina ossea of the first whorl are involved in the suppurative process. The spiral ganglion contains mostly connective tissue, only a few ganglia cells, for the most part shrunken, and in some sections pieces of bone (Fig. 3). The missing nerve fibres of the first whorl and at the zona ossea are replaced by pus cells lying between the engorged blood-vessels. The endosteum of the scala tympani has become unravelled and is covered by a small zone of pus cells. The spiral ganglion thus cannot have been invaded by pus, which probably was propagated from the modiolus.

First whorl of the right cochlea.

The basal whorl is chiefly affected by a new-formation of bone in the scala tympani, caused by the scarlatinous otitis, reaching its highest degree in its centre, so that it is impossible to determine the limit between the new-formed osseous tissue and the cochlear capsule. The sections in the direction towards the fenestra rotunda exhibit the starting-points of the later ossification: 1. The endosteum of the tympanic surface of the lamina spiralis ossea. 2.

A new-formed layer of connective tissue arising from the membrane of the fenestra rotunda along its inner surface. 3. The layer of connective tissue of the spiral ligament. The ossified tissue runs from all directions toward the centre; the remaining free space contains the inflammatory products of the terminal affection. The vestibular portion of the lamina spiralis ossea is supplanted by connective tissue. In the ossified range very little of the structures of the ductus cochlearis was preserved. The basilaris membranacea was thickened and, as well as the scala vestibuli, covered by groups of granules or granular cells and detritus. The m. tectoria was wanting, Reissner's membrane preserved, the spiral ligament infiltrated with large round cells, the blood-vessels choked, a broad layer of pus cells along the region of the stria vascularis.

Condition in the non-ossified portion of the scala tympani.

In a net of finely fibrillated tissue few round cells, mostly large, some of seal-ring shape (Steinbruegge); some had a light space between their walls and protoplasma. Many communicated by their threads with others. In the upper portion of the basal whorl the endosteum was hyperplastic and infiltrated with pus. Numerous broad trabeculae of connective tissue infiltrated with pus, with new-formed engorged blood-vessels between them, traversed the scala tympani.

The vestibular apparatus.

The labyrinthine ligaments and partly the crista acustica, more or less infiltrated with small and large granulation cells and blood-vessels abundantly filled, especially at the sacculus. The ligaments of the frontal ampulla are perfectly destroyed, as well as the periosteum of the adjoining bone, through which a necrotic canal passes to the labyrinth wall. *The affection of the horizontal semicircular canal* is important (the two others were normal). The endolymphatic space is entirely, the perilymphatic mostly, obliterated; the surrounding bone irregular, sinuous. The endolymphatic space is filled with connective tissue, ossified on a small place, and blood-vessels. For more particulars see the description of Fig. 1.

THE CHANGES IN THE LEFT LABYRINTH.

Although the facial nerve from its second bend was stained black by osmium, it is peculiar that both nerves and a few twigs of the auditory nerve do not show any staining by osmium, but only by chromic acid. The purulent destruction of both nerves in the meatus aud. internus beyond the ganglion geniculi is more marked than on the right side. In regard to the destroyed ramus cochleæ of the first whorl see Fig. 3, *N*. The modiolus in several sections is perfectly corroded, and the suppuration extends to the third whorl. The ramus sacculi and the frontal ampulla are likewise infiltrated with pus. A fistula in necrotic bone encircling the spiral ligament, from the inner end of the porus acust. int. to the destroyed periosteum of the labyrinth wall, invaded partly the new-formed bone in the scala tympani.

First cochlear whorl (Fig. 3). The largest portion of both scalæ is ossified. In the remaining portion of the scala tympani: signs of recent inflammation, engorged blood-vessels, small extravasations of blood, large, round, and oval cells, communicating with each other by processes, imbedded in connective tissue, lymphoid and granular cells, and fine blue detritus. Reissner's membrane, half preserved, covered with granules. The sulcus spiralis internus filled with black granular cells (osmium); the lamina ossea atrophic, the vestibular portion consists totally, the tympanic partly, of connective tissue. From the remaining bone of the latter new-formed osseous fibres run into the scala tympani (Fig. 3).

LIGAMENTUM SPIRALE AND DUCTUS COCHLEARIS.

First whorl: Corti's organ almost entirely missing, only a nest of cell groups could be found. Reissner's membrane ruptured in the centre, the rest infiltrated with pus (Fig. 3 *rm.*). In the ductus cochlearis an accumulation of pus cells, but mostly large black granular cells. The connective tissue of the spiral ligaments partly thickened, blood-vessels very much injected, the whole ligament down to the bone infiltrated with pus. *Second whorl*: At its com-

mencement the intermediate stratum of the spiral ligament is destroyed. The innermost portion and Reissner's membrane, curved like an arch, are detached and displaced into the ductus cochlearis. The concavity of the arch is completely filled with a conglomeration of round apparently pavement-cells, arranged in mosaic form (undoubtedly mechanically). Corti's membrane is detached and forms a crescent over the crista spiralis. The sulcus spiralis int. is empty. Corti's organ wanting, further up the spiral ligament consists only of a string of connective tissue, almost attached to the membrana tectoria. The basilaris between crista and spiral ligament is displaced in form of an arch towards the scala vestibuli, covered with small round cells and black granules. Ganglion spirale and zona ossea normal. In the *third whorl* only a narrow strip of the perosteum of the spiral ligament was left, otherwise the same condition as in the second. *In both no trace of recent inflammation or suppuration.*

The left vestibular apparatus showed the following remarkable changes: The upper portion of the frontal semicircular canal consists chiefly of connective tissue and blood-vessels with thick walls, containing but little blood. The endo- and perilymphatic form a common space filled with material described above. In the lower portion the configuration of the lamina is normal, but the endolymphatic is half filled with large black granular cells. The perilymphatic ligaments and a portion of the bony enclosure are destroyed by recent suppuration. The nervous apparatus of the crista of the frontal ampulla is destroyed by pus, the cupula terminalis hidden (or destroyed?) by pus cells. On the ligaments of the horizontal ampulla and its meshes large, round, and oval cells and pus.

Both aquæductus cochleæ obliterated. The *aquæductus vestibuli* contained granular cells, and the bony wall was sinuous, probably from necrosis in consequence of the scarlatinous otitis.

EPICRITICAL REMARKS.

The changes found post mortem were mostly due to the *scarlatinous panotitis*, undoubtedly existing three years before

death: The destruction of both *Mtt*, the exfoliation of hammer and anvil in both, the dislocation of the stapes, the superficial and central healed osteonecrosis, the changes of the intrinsic muscles, the formation of cysts, the atrophy and epidermoidal transformation of the mucous membrane from the immigration of epidermis from the remaining *Mt.*, finally the granular cells on the labyrinth wall.

The following changes in the labyrinth must be attributed to scarlatinous otitis:

1. The new-formation of bone in the first whorl of the cochlea, the destruction or metaplasia of the lamina ossea into connective tissue, the destruction of Corti's organ, etc. The changes in the left second and third whorl are due to the *old* process. We think that the micro-organisms emigrated from the vessels of the cochlear endosteum, at the time of the scarlet fever, caused partly an irritation of the endosteum and consequently a new-formation of bone, partly necrosis and atrophy of the lamina ossea and the structures of the ductus cochlearis. Besides the atrophy of the ganglion spirale on one side and the nerves of the zona ossea on both, the above changes in both cochleæ were sufficient to produce *total deafness*.

2. The changes in two semicircular canals of one side and one on the other. Referring to my former descriptions of changes in the semicircular canals in these ARCHIVES and *Virchow's Archiv*, vol. cxxiv., I do not hesitate to explain these changes as *originating in giant cells, and the wavering character of the clinical picture as produced by the morbid process in the semicircular canals in both petrous bones*.

As the *result of the terminal affection* the following is to be considered:

1. The recent purulent inflammation in the niches of both fenestræ. It is remarkable, that the greatest portion of the mucous membrane of the labyrinth wall, transformed into epidermis, was not only free from any recent inflammation, but even without cell-elements and any vessels to speak of. The epidermoidal integument certainly offered a great resistance to the invasion of micro-organisms from without, although, as proven by me (*Deutsche med. Woch.*, 1891, Nos.

11 and 12), the microbes find a favorable culture-soil in the *epithelial cells* of the developed cholesteatoma, complicating it very much.

2. The *recent necrosis* of the facial canal and the niche of the fenestra ovalis.

3. The bilateral necrosis of the cochlear capsule and the partial destruction of the osseous tissue, newly formed in the former affection, in the scala tympani of the first whorl of the right cochlea.

4. The more or less extensive inflammation of both vestibular apparatus.

5. The destruction of the auditory nerves and a portion of the facial nerves by suppuration and hemorrhages, with their consequences for the modiolus, the non-ossified portion of the first whorl, the endosteum of the scala vestibuli and the spiral ligament. The almost symmetrical necrosis of both cochleæ from the porus acusticus internus to the labyrinth wall, shows the possibility of a secondary bilateral otitis media starting from the labyrinth. The missing cellular or purulent infiltration at the perforation of the labyrinth wall seems to speak against a course in an opposite direction.

THE MORBID AGENTS OF THE TERMINAL AFFECTION.

According to the investigation of Foà and Bordone-Uffreduzzi,¹ Fraenkel,² Netter,³ Weichselbaum⁴ and Schwabach,⁵ the diplococcus pneumoniae (A. Fraenkel) is supposed to be the *producer* of *cerebro-spinal meningitis*. On the other hand, Bonome⁶ found in a small epidemic of cerebro-spinal meningitis a new species of streptococcus with qualities differing from the micro-organisms so far known as the excitants of inflammation. Huguénin⁷ found in the exudations of *pri-*

¹ *Deutsche med. Woch.*, 1886.

² *Zeitschrift f. klin. Med.*, 1886, p. 437; *Deutsche med. W.*, 1886, No. 13; *Berl. klin. Woch.*, 1886, Nos. 22, 23, 24.

³ *Arch. gén. de Méd.*, 1887.

⁴ *Monatsschr. f. Ohrenh.*, 1887, No. 9.

⁵ *Zeitschr. f. klin. Med.*; vol. xviii., Nos. 3 and 4.

⁶ A. Bonome: "Zur Aetiologie der Mening. cerebro-spin. epid.," *Ziegler's Beitrage*, vol. viii., p. 377.

⁷ "Infectionswege der Meningitis; I. Die Infectionstraeger," *Correspbl. f. Schweiz. Aerzte*, 1889, No. 22.

mary and *secondary* meningitis: staphylococcus pyogenes aureus, streptococcus pyogenes, bacillus meningitidis Neumann Schaefer, pneumococcus Fraenkel, bacillus meningitidis intracellularis. Weichselbaum, Goldschmitt, and Adenot¹ found Friedlaender's pneumobacillus and the typhoid bacillus. Mine is a case of purulent meningitis (basilaris and convexitatis), whether primary or secondary, is difficult to decide; the latter is more likely. I found a staphylococcus (Fig. 4) as the morbid agent between the fibres of the auditory nerve in the porus acusticus internus and in the canalis centralis modioli, in the necrotic bone of the right cochlear capsule. No cultures were made, so that it could not be ascertained whether it was staphylococcus aureus or one of the other species. Considering its well known intensive action causing suppuration, the extensive ravages of the terminal affection are not surprising. No tubercular bacilli were found anywhere. The aggregation of lymph cells in the scala tympani of the first whorl of the cochlea may be mentioned as due to a mechanical action of the immigrated micro-organisms.

Explanation of Figures.

FIG. 1. Sagittal section through the medial portion of the horizontal semicircular canal of the left petrous bone. Hartnack $\frac{3}{4}$, tube o. Stained with osmium-picrocarmin. The endolymphatic space is completely obliterated, the perilymphatic mostly. No sharp-edged osseous border as in the normal. The edge is alternately convex and concave, irregular in consequence of former necrosis, the result of which may be traced far into the adjoining bone at *k n k*. The remaining small perilymphatic lumen is mostly filled with blood corpuscles and granular cells, stained black by osmium. The rest consists of more or less dense connective tissue covered by round cells with one nucleus only on the very light places (to the right in the drawing), and blood-vessels either empty or filled with blood corpuscles or fatty detritus black by osmium. The place pointed out by the arrow is represented in

FIG. 2. (Hartnack $\frac{3}{4}$, tube o.). It was the only one which showed more marked staining with carmin and commencing new-formation of bone.

¹ *Des Méningites Microbiennes*. Avec 8 figures. Paris, 1890.

Fig. 3. From a sagittal section through the left cochlea. First whorl. Osmium-picrocarmin. Hartnack $\frac{3}{8}$. Tube o. N = trunk of the nerve of the first whorl, infiltrated with hemorrhages and pus. *g* = blood-vessel with thickened wall; *rgsp* = region of spiral ganglion shrunken by the propagation of the ossification in the cochlear scalæ in centripetal direction. The ganglion itself is traversed by bone processes; the rest consists of connective tissue and shrunken ganglia cells. *St* = scala tympani, its lumen nearly obliterated by ossification, the remaining portion filled with connective tissue and blood-vessels. *Sv* = scala vestibuli, of which a great portion is filled with newly formed osseous tissue originating in the endosteum. In the free lumen a remnant of the detached Reissner's membrane, = *rm* without its cellular attributes, is visible from the surface, instead of from the side; molecular detritus, a small and a larger conglomeration of lymph-cells, the larger shows clearly a stratified arrangement. *Lsp* = ligamentum spirale, consisting of osteoid tissue. *Crsp* = crista spiralis; Corti's organ, situated between the two, is missing. *Lspo* = lamina spiralis ossea, abnormally curved; the light stripe between its two portions is the optical appearance of the atrophied nerves of the zona ossea.

FIG. 4. From a sagittal section through the labyrinth wall of the left petrous bone in the direction toward the niche of the fenestra ovalis. Osmium-picrocarmin. Hartnack $\frac{3}{8}$, tube o. *No* = niche of the fenestra ovalis. *Stp* = foot-plate of the stapes. *gckn* = healed central osteonecrosis. *Nf* = nervus facialis. *Rpl* = branch of the plexus tympanicus running under the epidermoidal mucous membrane. *sq* = three sequestra of different sizes and forms covered by hypertrophied mucous membrane. *he* = horseshoe limit of a former superficial necrosis of the labyrinth wall, filled with dense connective tissue. It shows still some lacunæ from former decay and some black foci (osmium) of granular cells. The configuration of the remaining bone shows the characteristic necrosis as well as, even in a higher degree, the lateral osseous wall of the Fallopian canal. In a lateral direction from the latter, smaller and larger conglomerations of granular cells are situated. The mucous membrane in the niche of the fenestra ovalis lost its epithelium. Its surface consists of several lamellæ of epidermis. It is infiltrated throughout, partly with large fatty degenerated elements without nuclei and showing no staining, partly with granular black (osmium) cells.

FIG. 5. From an epidermis-bridge between the lateral wall of the facial canal and the capitulum of the stapes. Sagittal section. Hartnack $\frac{3}{8}$, tube α . A single horny stratum under which numerous differently shaped cells, containing mostly nuclei cut in different directions. A large portion, mostly of cells without nuclei, is encapsuled by one or more concentric lamellæ of epidermis. The encapsuled portions are round, oval, and of very different sizes.

FIG. 6. Micrococci and staphylococci from a necrotic bone fistula of the left cochlear capsule. Gram. Xylol Canada, Leitz immersion $\frac{1}{2}$, tube o.

REMOVAL OF THE STAPES.

By CLARENCE J. BLAKE, M.D., BOSTON.

THE clinical experiences of various observers in regard to the mobilization of the stapes which have been recorded from time to time, together with recent observations of an experimental character made upon animals, some of them a continuation of work already done, have led otologists to the serious consideration of a further and more conclusive step in the surgical treatment of chronic non-suppurative disease of the middle ear by the removal of the stapes. The reasoning by which this conclusion has been reached, and which will probably be found on comparison of their work to have been simultaneously carried out by many different investigators, is one following what has been the natural sequence of operative procedure in the middle ear for many years, from the outer limit of the sound-transmitting apparatus, the membrana tympani, inward to the final member of the ossicular chain.

So far as the question of the possibility of the operation was concerned, experience in the removal of the two larger ossicles, and also of the accidental evulsion of the stapes in cases of suppurative disease of the middle ear, either in the progress of the suppurative process, or incidentally to the removal of the other bones, or of granulations, gave favorable indications both as to comparative freedom from danger to the patient and possibility of improvement to the hearing from this procedure, while the report of cases of mobilization of the stapes, either intentionally or accidentally, as consequent upon the removal of the larger ossicles

in chronic non-suppurative disease of the middle ear, still further pointed in the direction of the ultimate step in surgical interference with the sound-transmitting apparatus. In confining the consideration of this subject in the present paper to the question of the operation of "stapedectomy," as it may be called until a better title is offered, in cases of non-suppurative disease of the middle ear, it should be had in mind that the subject opens up a wide field for investigation, and one which, to be properly covered, should enlist the services of the anatomist and pathologist, as well as the clinical observer and that it and the studies which it will suggest cannot fail to lead to a better understanding of many hitherto obscure changes occurring in the middle ear in consequence of non-suppurative disease, and to their remedy by other and already familiar surgical means, as well as by the resort, in appropriate cases, to stapedectomy itself. A step in this direction, and one which would naturally suggest itself to any aural surgeon of experience in the performance of middle-ear operations, and which affords an opportunity for that process of diagnosis by elimination often of so much importance in doubtful cases, is the performance of the preliminary exploratory incision of the membrana tympani and the subsequent operations, including stapedectomy, under cocaine and without an anæsthetic, for it is evident, on even a cursory mental review of the pathology of the middle ear in chronic middle-ear disease, that changes seriously impairing the transmission of sound may occur in one part or another of the ossicular chain, the articulations, the fenestral attachment of the stapes, or the membrane of the round window, and escape detection except upon subjection to such direct inspection and test of the hearing power and of the patient's subjective symptoms as an operation upon the middle ear under conditions of consciousness and freedom from pain would afford. The subject of impaired mobility of the ossicular chain and of ankylosis, especially of the stapes, is one which has received interested attention from the time of Morgagni in 1766 and Meckel in 1777, through a long line of observers, including Toynbee, Bonnafont, Kessel, Politzer, Gruber,

Lucae, Gellé, Baracz, Miot, Boucheron, Schwartz, Moos, and others, but the first serious consideration of an attempt to relieve or remove this obstruction to the passage of sound at the oval window by removing the stapes itself is, so far as I am aware, to be credited to Kessel,¹ who, in 1871, removed the stapes and columella in dogs and pigeons respectively and, in the human subject, after dividing the tendon of the stapedius, circumcised and mobilized the stapes and, as the result of this experience, then expressed the opinion that a still better result would have been attained had the stapes been extracted and a membrane allowed to form in the oval window, which would vibrate more readily than the stapes even under the condition of mobilization in which it was left by the operation of circumcision.

The accuracy of opinion as expressed by Kessel has since that time been confirmed in several instances by the accidental evulsion of the stapes at the hands of different observers and in my own experience, and without doubt in that of others also, by definitely planned operations for this purpose.

The simplicity of the operation of stapedectomy itself does not imply the permissibility of any lack of precaution as regards antiseptics, or as to the extent of the interference with the tympanic cavity, and in both of these respects every care should be taken. The ear to be operated upon should be first carefully tested as to its hearing power, both by aërial and bone-conduction, and with due reference to the possibility of sound transmission either by aërial or bone-conduction to the other ear.

The external auditory canal should be cleansed of cerumen and loose skin and then washed with a weak bichloride solution on a cotton-tipped probe and stopped with antiseptic cotton until the time of the operation. The instruments need be only such as are found in any well equipped aural clinic, namely, a paracentesis needle, a small angular knife for the division of the articulation of the incus and stapes,

¹ Kessel, *Sitzber. d. Ver. d. Aers.*, in Steirmark' xiii., 1875.

a small blunt hook and a pair of light but strong angular forceps; there may be added also a small rectangular knife to be passed between the incus and stapes, after division of the joint, to make sure the separation is complete, and a pair of very fine straight-tipped forceps to be passed into the stapedia niche if necessary for the removal of a portion of the bone in case of fracture in the attempt at extraction. These instruments, preferably made to fit into angular handles, of which there should be as many provided as there are different instruments in order to facilitate speed in operating, are placed at the right of the operator on a table with a glass top suitably cleansed or upon a sheet of paper or cloth; there should also be at hand a number of cotton-tipped probes, a small bowl containing a weak bicarbonate of soda solution, and also, in wide-mouthed bottles or glasses a saturated solution of boracic acid in alcohol, one of a 10 per cent. and another of a 20 per cent. solution of cocaine. The specula, having first been thoroughly cleansed, are filled with antiseptic cotton until required for use; the hands of the operator and of an assistant, if one is present to pass the instruments and roll the cotton upon the probes, should be washed and sterilized, as should also parts about the ear of the patient with which the surgeon's hands come in contact. By dipping the instruments just before using them in the alcohol and boracic acid solution the resulting white deposit of the acid gives the instrument a dull surface and makes it, especially in a strong light, more plainly visible, by preventing reflections from the polished steel.

From three to five minutes before the operation a few drops of a 10 per cent. solution of cocaine are forced into the Eustachian tube through a catheter; the patient is then seated erect in a high-backed chair, his head being firmly held by an assistant, this method being found preferable to the recumbent position and to mechanical support for the reasons that with the patient's head erect it is much more easy for the operator to determine the relative positions of the parts of the middle ear exposed by operation and the angle of attachment to the stapes, a very variable one and of importance from an operative point of view, and that the

position of the head can be adjusted at command as the operation proceeds.

The first step in the operation itself, the incision of the membrana tympani, may be made with the paracentesis needle, and the cut which I prefer, after having tried both the triangular and small semilunar flaps, is the one which I have heretofore used for mobilization of the stapes, and is a modification of that of Miot—but is an incision merely and not an excision of the membrana tympani, and begins at a point midway between the short process and the tip of the long process of the malleus and close to the manubrium, then extends upward along the posterior ligament of the short process and follows the periphery to a point posteriorly on a line with the tip of the manubrium, or it may begin at the point last mentioned and be carried in the opposite direction, in either event the result being the same in the formation of a large flap which falls downward and outward leaving an unencumbered opening with free access to the subsequent field of operation; bleeding from the edges of the cut is stilled by the application of a sterilized cocaine solution, the hearing is tested if desirable, and the operation is continued, the next step being the division of the tendon of the stapedius by means of a paracentesis needle or the short curved knife of Kessel or Miot or if the stapes is situated forward and in full view the division first of the incudo-stapedial articulation, which is done by means of a small angular knife, a larger angular knife being subsequently passed behind the incus to insure separation. If it has been decided to remove the incus as well as the stapes, either for the purpose of obtaining better access to the latter bone or because the articulation of the incus with the malleus has been ruptured in the process of dividing the incudo-stapedial articulation, it may be done at this point of procedure, the large flap opening made in the membrana tympani being adequate to this as well as to other possible contingencies of the middle-ear operation.

An examination of the stapes by means of a probe and blunt hook and a repetition of the hearing tests help to

determine at this stage of the proceeding whether the stapes shall be merely mobilized mechanically, by division of folds in the niche or by circumcision, or whether it shall be extracted. In the former instances the usual measures, as given by Kessel, Schwartz, Miot, and others, may be followed; in the latter the stapes should be first mobilized and then extracted, the best instrument for this purpose being a slender, blunt hook, curved very slightly backward, which is passed behind the head and between the crura either from below upward, or in the opposite direction, the latter being often the more convenient, especially if the stapes has been previously well mobilized. The resistance offered to the traction of the hook varies considerably, as would be expected, in different cases: where the stapes comes away entire, there is first a sense of contact resistance, followed by a sense of suction, resistance occurring presumably at the moment of separation of the base-plate from the window, where however, as in the cases of atrophy of the crura, the latter break, leaving the foot-plate in position, the contact resistance alone is felt. At the moment of removal of the stapes there is, in the majority of cases, a decided change in the character and rate of the pulse, which becomes smaller and either increased or decreased. Vertigo is not necessarily present, but should always be regarded as a contingency, and possibly a protracted one. The principal hemorrhage, aside from the bleeding of the membrana tympani, is that which occurs on the division of the tendon of the stapedius, and the use of a fine cotton-tipped probe at that moment prevents the filling of the niche with blood. After the operation the ear should be tightly stopped with sterilized cotton or gauze, and the patient kept quiet for two or more days.

The following are presented as illustrating two types of cases, the one in which the stapes is fractured, and the other in which it, together with the incus, is successfully removed, both being done under a method of procedure which, availing of the patient's intelligent co-operation, is valuable for purposes of diagnosis by elimination during

operation as well as for the operation itself in chronic non-suppurative middle-ear disease with a view to the improvement of hearing.

The first case was that of a man twenty-nine years of age, first seen in October, 1878, with a history of impairment of hearing in both ears following typhoid three years previously; the hearing had subsequently improved, but had again decreased in consequence of head colds. At that time both membranæ tympani were slightly opaque, and the hearing in both ears for a watch, tuning-fork, and voice was much less than the thickening in the middle ear, as judged by the opacity of the membranæ tympani, would apparently warrant; the watch was not heard on contact, and the voice in a moderate tone only within a foot of each ear and better in the right; the hearing by bone-conduction was good in both ears.

A diagnosis of thickening of the tympanic mucous membrane, especially about the stapes, was made, a prognosis of possibly slight improvement only was given, and treatment of the middle ear by means of the catheter with stimulating vapors was begun and continued at intervals for three years, but without appreciable improvement.

In October, 1881, it was decided to attempt mobilization of the stapes, and this was done through a crescentic incision in the posterior-superior segment of the membranæ tympani, with a result of slight improvement in hearing aërially, which lasted three days and then gradually decreased. Subsequently treatment, including care of general health, occasional use of the Eustachian catheter, and more or less continuous massage (Hommel's procedure) resulted apparently in a maintenance of the hearing in the right ear, the left ear having become comparatively useless.

It was finally proposed to resort to the operation of stapedectomy in the left ear, and as the case was one which had been followed with care in its observation, it was decided to do the operation under conditions which would permit testing both the hearing and the tactile sense of the patient during the operation. Personal experience as well as the recorded observation of others having shown the inefficiency of cocaine instillations in the external auditory canal for local anæsthesia, it was decided to make the first incision in the membrana tympani

under the influence of cocaine introduced per tubam, and to follow this up by further cocainization of the middle ear through the incision, should that be necessary, previous experiments made in tenotomy of the stapedius, disarticulation, circumcision, and mobilization of the stapes having shown these parts to be exceedingly tolerant of interference so far as painful sensation was concerned.

The operation was substantially that above described.

The cut in the membrana tympani caused no pain, and the hearing tests which had been made before the operation and were now repeated, gave the same results. Politzer's acoumeter was heard when held so close to the ear that the hammer was on a line with the posterior border of the concha; the tuning-fork, 512 v. s. (single vibrations), was heard aërially $\frac{2}{3}$ ths, and by bone-conduction $\frac{3}{5}$ ths; Politzer's forks Nos. 1 and 2 were not heard aërially, nor was Galton's whistle, ranging from 6,000 v. s. to 12,000 v. s., this examination proving that the resistance to the sound waves was to be sought at the farther end of the ossicular chain.

The remainder of the operation was painless, except when the shaft of the instrument touched the cut edges of the membrana tympani, but was accompanied by the auditory sensations with tenotomy and disarticulation already described.

Efforts¹ at mobilization showed the stapes to be firmly fixed, and in an attempt at circumcision by means of a fine paracentesis needle the knife met with bony resistance on the superior and posterior borders of the niche, and gentle traction, made with a blunt hook, resulted in the coming away of the head and both crura of the stapes, broken off close to the foot-plate. There was no sense of suction on this extraction, no vertigo, no change in pulse, and no special sensation on the part of the patient except a snapping noise which was presumably heard at the moment of fracture. Investigation of the fenestral niche by means of the probe showed the base-plate to be apparently fixed by bony union, especially to the posterior and superior walls, the surface of the base-plate also seemed to be roughened; and this condition, taken in connection with the subsequent examination of the crura, which showed them to be distinctly atrophied, placed this case in the class described by Schwartze, where

¹ Parts of this and the next case have been published in *The Boston Med. and Surg. Journ.*

atrophy of the crura follows long-continued ankylosis of the base-plate of the stapes.¹

The whole operation, including the tests made in its progress, lasted but twelve minutes, and was without pain to the patient, who was, however, it should be said, a well man of an equable temperament. Five days after the operation, during which interval there had been neither pain nor other discomfort, the hearing-tests in the left ear gave the same results for Politzer's acoumeter and for the duration of the tuning-fork aërially, but the hearing was improved in the following respects: Galton's whistle, previously not heard at all, was now heard throughout its whole register; the tuning-forks (Nos. 1 and 2) were heard plainly, as was also the voice in a low tone close to the ear; a loud voice, however, even if one or more feet distant, was heard only confusedly, though with the facility acquired through long deafness the sentences used in testing were construed rather than heard, a circumstance which illustrates the importance in voice tests, not only of reproducing the voice with as nearly as possible the same pitch and intensity, but also of constructing the test sentences with a deference to the force value of the consonant sounds.

In the second case, that of a woman fifty-five years of age, the operation included the removal not only of the stapes, but the incus also. She was first seen in April, 1876, on account of chronic catarrhal inflammation of both middle ears, the hearing distance at that time being for Politzer's acoumeter in the right ear 2 centimetres, and in the left ear 25 centimetres. Under local treatment the hearing in both ears at first improved, but subsequently decreased until at the time of the operation the acoumeter was not heard in the right ear, neither the upper portion of the scale of Galton's whistle, nor the tuning-fork 512 v. s. was heard. As the hearing in the left ear was also materially decreased, it was decided to operate upon the right ear. The incision in the membrana tympani was the crescentic peripheral cut already described, and was made with comparatively little discomfort, the only further use of cocaine in addition to the first injection consisting in its application to the edges of the cut, care being taken not to carry it into the ear.

¹ Schwartz: *Pathological Anatomy of the Ear*, translated by J. Orne Green, M.D., p. 120.

Tests of hearing at this stage of the operation showed no improvement or change, either by aërial or bone-conduction, and served to confirm the diagnosis of fixation of the stapes in consequence of the long-continued thickening process in the middle ear. Careful tactile examination of the accessible portions of the inner tympanic wall, especially in the neighborhood of the fenestral niche, by means of a probe, showed lack of sensitiveness to touch, with exception perhaps of a slight pricking sensation; if, however, the probe came accidentally or intentionally in contact with the cut edges of the membrana tympani, especially on its superior posterior margin, there was sense of discomfort, which amounted to pain as the effect of the cocaine passed off, which it apparently did before the more important part of the operation was continued, and care was therefore taken in subsequent manipulations to avoid touching the edges of the opening of the membrana tympani. Under these conditions the operation continued and was completed, including the tenotomy of the muscle, disarticulation and removal of the stapes without pain to the patient. The division of the muscle caused a sensation of a dull thud to the patient, and in dividing the articulation between the incus and the stapes, the grating sound made by the knife was distinctly heard. The ankylosis at this point was very firm, and the disarticulation was effected with such difficulty that at its completion the incus dropped, not only outward, but also slightly downward, in such a manner as to show that it was separated from the malleus also; under this condition its removal seemed advisable, and this was easily done by means of the blunt hook and forceps, the only pain caused being incident to the passage of the body of the incus through the opening in the membrana tympani. The stapes was now plainly in view: and as no improvement in hearing had been so far effected, this bone was also extracted by means of the blunt hook passed between the crura from above, and came away with the sensation to the patient of a loud report, but without causing either pain or vertigo; the pulse, which had been 80, rose to 100 and became weaker, but returned to its former rate and volume within two minutes.

Subsequently to the operation, in both of the above cases there was no other discomfort than that naturally incident to holding the head in a constrained position; and in this respect, as well as in the conditions of the operation itself,

the result was a satisfactory one. Indeed, the use of the cocaine may, in most cases of middle-ear operation of the above class, be limited to the region of the membrana tympani, and may therefore be introduced through a preliminary incision, as has been heretofore done with similar openings made for simple mobilization of the ossicula. In an operation of this kind begun under cocaine, there is also always the alternative of recourse to ether or chloroform should the local anæsthetic fail of its effect or the patient find the restraint of self-control too great an effort.

(To be continued.)

REPORT ON THE PROGRESS OF OTOLOGY DURING THE FIRST HALF OF THE YEAR 1892.

By Prof. AD. BARTH, MARBURG, AND
DR. A. HARTMANN, BERLIN.

Translated by Dr. MAX TOEPLITZ, New York.

FIRST PART: ANATOMY AND PHYSIOLOGY.

By AD. BARTH.

A.—ANATOMY.

a.—ORGAN OF HEARING.

1. SANDMANN, G. Colored plate of the human hearing organ, with explanatory text. Published by Boas & Hesse, 1892, Berlin.
2. SIEBENMANN, F., Bâle. The metal corrosion of Semper's specimens of the ear, with three plates. *Anatomische Hefte*, No. 3, 1892.
3. WEICHSELBAUM'S *Elements of Pathological Histology*, Part xiii. *Hearing Organ*, by Dr. B. GOMPERZ. Published by Deuticke, 1892.
4. TISCHKOW, W. *Othæmatoma*, St. Petersburg, 1891. (Reviewed in *Neurolog. Centralbl.*, 1892, p. 28.)
5. GOMPERZ, B. Contribution to the study of regeneration of the substantia propria in cicatrices of the membrana propria.
6. SCHEIBE, ARNO. Influenza bacilli in otitis media. *Münch. med. Wochenschr.*, 1892, No. 14.
7. SALA, L. The origin of the acoustic nerve (sur l'origine du nerf acoustique). *Arch. Ital. de Biol.*, vol. xvi. (Reviewed in *Neurolog. Centralbl.*, 1892, p. 200.)

8. Prof. VON BECHTEREW. Contribution to the study of the striæ medullares of the medulla oblongata. *Neurolog. Centralbl.*, 1892, p. 297.

1. The plate supplies a want of the teacher. It contains all that may be demonstrated in one specimen of the anatomy of the ear.

2. SIEBENMANN gives two illustrations of each right and left hearing organ in the child and in the adult, taken from dry corrosion specimens—and three illustrations of corrosion specimens of the soft parts of the middle ear.

3. This is a brief treatise of the entire pathology of the ear, in which the most important facts are described in a pleasing style.

4. The name of othæmatoma is used for different affections of the auricle. The true othæmatoma occurs almost exclusively in progressive paralysis and offers an unfavorable prognosis. TISCHKOW observed ten cases, five of which occurred in paralytics. The microscopical examination demonstrated the fact, that in the aural cartilage of paralytics new formation of blood-vessels takes place, which grow from the perichondrium into the cartilage. The elastic fibres frequently lose their gloss and the cells undergo fatty degeneration. These changes may advance to partial necrosis of the cartilage. The blood extravasation being within the cartilage, absorption proceeds slowly. Hence follows the author's view, that hæmatoma may develop spontaneously without trauma.

5. GOMPERZ, in a petrous bone of an adult, found a large portion of the membrana tympani replaced by cicatrix. It was three times thicker than a normal membrana tympani at the same place. This thickening essentially involves the membrana propria, which consists only of radiary fibres. Complete replacement of the destroyed membrana tympani by another membrane was found by Gomperz in one per mille.

6. SCHEIBE, as in twelve cases two years ago, demonstrated this year in three additional cases of fresh influenza otitis, the constant occurrence of bacilli, which, when compared with Buchner's specimens are positively considered as influenza bacilli.

7. Deiter's nucleus, the nucleus angularis or Bechterew's nucleus, and also the cells of the so-called inner acoustic nucleus

do not bear any relation to the acoustic nerve. The nuclei from which the acoustic originates, are rather the so-called anterior nucleus and the tuberculum laterale. SALA made his investigation in the new-born cat and in the bovine embryo.

8. The striæ of cats and rabbits are not analogous to the striæ medullares of man. They cannot be considered in man a direct continuation of the acoustic nerve, but they form either secondary paths arising from the tubercular acusticum or they have nothing in common with the acoustic. BECHTEREW holds the latter view; neither do they bear any relation to the funiculi teretes, to the pneumogastric, the glosso-pharyngeus, and trigeminus. They most probably constitute a connection of the basal portions of the cerebellum.

b.—MIDDLE EAR.

I. CHATELLIER. Anatomy of the middle ear. Presentation of serial sections (*anatomie de l'oreille moyenne. Présentations de pièces coupées en série*). *Soc. Paris de laryng. et otol.*, 1892, February.

I. CHATELLIER explains the technique of his sections presented to the society (decalcification in Müller's fluid and formic acid, embedding in celloidin, staining with eosin-hæmatoxylin). He aims principally at demonstrating the position and extent of the attic and to prove that it is separated from the tympanic cavity posteriorly as well as anteriorly. The points of separation in the antero-posterior direction are as follows: the osseous plate separating the attic from the external auditory meatus, the projection of the margin of the membrana tympani, the ligamentum externum of the malleus, the neck of the malleus or the lower portion of the head, the tendon of the tensor tympani spreading toward the promontory, and the processus cochleariformis.

GELLÉ.

c.—NASO-PHARYNGEAL CAVITY.

I. ZARNIKO, C. Contributions to the histology of nasal tumors. (From Dr. Hartmann's clinic for nasal and aural diseases.) *Virchow's Archiv*, 1892, vol. cxxviii.

I. The masses removed from the nose and naso-pharynx of a patient consisted partly of œdematous fibromata, partly of tumors, which were distinguished from those by irregular cristæ, villi-

noduli, and intermediate sulci and grooves. The latter are covered, in addition to the cylindrical epithelium of the nasal mucous membrane, with plaster epithelium, especially marked by its thickness. It is considered as developed from cylindrical epithelium by chronic inflammation. ZARNIKO found among forty-nine benign new-formations, seven containing noduli, which extended directly from the turbinated bone into the tumor and are therefore to be considered as exostoses. Hence it follows that fibrous nasal tumors can no longer be considered as developed exclusively from proliferation of the mucous membrane.

B.—PHYSIOLOGY AND PHYSICS.

a.—HEARING ORGAN.

1. ZWAARDEMAKER. De Omvang van het gehoor als analogon van het gezichtsveld. (The extent of hearing as the analogue of the field of vision.) *Cz. Nederl. Tydschr. voor Geneeskunde*, 1892, part i, No. 16.

2. MARTINS. The time of reaction and the duration of perception of sounds. *Philosoph. Studien*, vol. iv., p. 394.

3. STEINER, J., Cologne. Spheres of senses and movement. *Arch. f. d. ges. Physiol.*, vol. L.

4. BONNIER, P. Perception of space in auditory sensations. (Perception de l'espace dans les sensations auditives) *Comptes rendues de l'Acad. des Scienc.*, October 26, 1891.

5. MILLS, CHARLES K. On the localization of the auditory centre. *Brain*, winter part, 1891. (Reviewed in *Neurol. Centralbl.*, 1892, p. 145.)

6. JACOBSON, L. Some novel apparatuses and instruments for galvano-cautery and electric illumination. Demonstration in the Berl. Medic. Gesellsch. *Berliner Klin. Wochenschr.*, 1892, No. 13.

7. MELDE, F. The determination of the velocity of transmission of sound in membranous bodies. *Annalen der Physik und Chemie.*, new series, vol. XLV., pp. 568 and 729, 1892.

1. ZWAARDEMAKER represents the extent of the perceptible sounds from the highest to the lowest by a line which he divides into four parts. The graphic conception of hearing is determined: 1, by the length of the line of hearing; 2, by its absolute position in the physical gamut. In order to represent both, a rectangle is erected upon the line of hearing, the vertical of

which is divided, according to the age, into five principal parts. In marking here the lines of hearing, as they present themselves under normal conditions with increasing age—slight decrease of the low sounds and more rapid of the high ones—the clinical cases can thus be inserted schematically. It greatly resembles the representation of a grain field, but does not give a clear idea of all forms of deafness.

2. The periods of reaction of sounds decrease steadily with increasing pitch. It is incorrect that, apart from the pitch of the sound, about ten vibrations are required for the production of a perception of sound. The duration of perception of sounds in the large extent of the gamut (C' to C'') depends upon their figures of vibration. It is doubtful whether we have to assume as the cause of this condition, that the excitation of the organ of perception or of the central substance does not transcend the threshold except after about three vibrations, or that the leading or central parts are excited at different intervals which are to be imagined as dependent upon the different velocity of the impulses.

3. STEINER could produce in pigeons ocular movements by electric irritation of the cerebral cortex, with exception of a small strip in the foremost and also in the hindmost portion. One cerebral side thereby acts upon both eyes, viz., in irritating the right cerebral half the right eye is moved forward, the left backward, and conversely. In addition, upon irritation of the cortex energetic contraction of the pupil of the opposite eye always takes place. As immediate consequence of the ocular movements, those of the head appear. In rabbits, the phenomenon discovered in dogs by Baginsky could be confirmed, that in irritations of one hearing sphere the opposite ear is moved. Movements of the head though were missing.

4. The different convergence of the sound-waves causes the membrana tympani to be moved in different ways. The transmission of this movement by means of the peculiar connection of the ossicles upon the labyrinth makes possible the perception of the direction of sound in the vestibule and the semicircular canals.

5. This is the description of a post-mortem examination of a woman, who, thirteen years previous to her demise, had been seized by word deafness and paraphasia with preservation of the knowledge of letters and of the faculty of writing, and nine years previous to death became entirely deaf with partial paralysis of

the left upper extremity. The autopsy revealed a bilateral lesion of the first and second temporal convolution. Mills arrives at the following conclusions : 1. The centre of the conception of words is situated on a level with the posterior end of the horizontal branch of the fossa Sylvii. It may perhaps be limited to the second temporal convolution. 2. The three remaining temporal convolutions do not take part in hearing. 3. A lesion of the left posterior end of the first and second temporal convolution produces more or less complete word-deafness, if the corresponding parts of the other hemisphere are intact. 4. The fields of all remaining auditory pictures of memory embrace a much larger province than that of the sensory word memory, viz., at least the last two thirds of the first and second temporal convolution. 5. In the left hemisphere the hearing centre and the special auditory centres of memory are more developed than in the right (N.B. in the right-handed.—Reviewer) ; but for complete deafness a lesion of the hearing centres of both hemispheres is required. 6. A lesion of the centre for the conception of words produces *per se* paraphasia and paralexia.

6. JACOBSON recommends for galvano-cautery an accumulator weighing $2\frac{1}{2}$ kilogrammes which is not filled with fluid. It produces also in large burners and snares white heat. The price is 30 marks. He recommends as a source of current for galvano-cautery and electroscopy an accumulator weighing 6 kilogr. at the price of 60 marks. For continued and frequent use the larger apparatus is preferable. Furthermore he describes an electric forehead lamp and burners made aglow at the extreme end only. The instrument may be ordered from Hirschmann of Berlin.

7. MELDE examined the velocity of sound in various membranous bodies, attaching them in an original way in glass tubes, rubbing them with gloves covered with colophonium, and determining the velocity according to Kundt's dust figures. He distinguished eight groups of bodies according to their structure. It followed from these experiments, that there exists a great difference not only by the structural difference, as *e. g.* between tissue and blotting paper, but that the conduction becomes at once much more retarded, principally in membranes, which in a measure are to be considered as coated, as *e. g.* copying paper with the coat of color or tissues with transverse threads. Hard-rubber becomes so much impressed in rubbing as to prevent the production of longitudinal waves.

b.—NASO-PHARYNX.

1. Prof. JASTROW. Observations on the absence of the sense of smell. *The Amer. Journ. of Psych.*, April, 1892.

1. A student, æt. twenty-one, suffered from complete anosmia. His mother had lost the faculty of smelling at the time of pregnancy. Perceptions of taste and temperature and the sensibility were normal. It was confirmed by experiments, that many sensations which are usually attributed to the perception of taste are to be considered as sensations of smell. No difference was experienced in the taste of tea, coffee, and hot water. The patient had only the perception of sweetness of the different fruit syrups. In recognizing a series of other substances, viz., Aq. amygd. amar., ether, peppermint, mustard and pepper, the patient displays great uncertainty.

SECOND PART:—PATHOLOGY AND THERAPEUTICS OF THE EAR AND NOSE

BY ARTHUR HARTMANN, BERLIN.

§ GENERAL LITERATURE.

1. LOEWENBERG. Influenza otitis observed at Paris in the year 1891. (L'otite grippale observée à Paris en '91.) *Annal. des malad. de l'oreille*, etc., and *Trans. Amer. Otol. Society*, 1891.

2. LANNOIS. Ear complications in the course of leukæmia. (Complications auriculaires au cours de la leucocythémie.) *Annal. des malad. de l'oreille*, etc., 1892, No. 1.

3. SZENES, SIGM. Therapeutic results obtained from some new remedies for the ear. *Allgemeine Wiener med. Zeitschrift*, 1892, No. 18.

4. EITELBERG, A., Vienna. Otological communications. *Wiener med. Presse*, 1892, No. 6.

4 a. MAX, EMANUEL, Vienna. A novel treatment of otalgia tympanica. *Wiener med. Wochenschrift*, 1892, No. 31, et seq.

5. BALLAGE, JOH. Circumscribed cerebral softening after injury to the membrana tympani and the tympanic cavity. *Mi. Orvöse heilath*, 1891, No. 46.

6. POLLAK, Vienna. The relations of the teeth to the ear. *Centralblatt f. d. ges. Therapie*, May, 1892.

7. MCBRIDE. Cysts of the tonsils, nose, larynx, and ear. *Brit. Med. Jour.*, May 14, 1892.

8. CHARAZAC, Toulouse. Contribution to the study of the malignant tumors of the ear. (Contribution à l'étude des tumeurs malignes de l'oreille.) *Revue de laryng., d'otol., etc.*, January, 1892.

1. LOEWENBERG reports that he has observed many cases of marked otitis media which had recovered after one administration of the air douche. In some instances this procedure was more frequently required, and in some cases of long duration the removal of adenoid vegetations led to a cure. Furthermore he describes two cases of chronic otorrhœa with kidney-shaped perforations of the membrana tympani, which did not recover completely. The recurrence of hemorrhagic myringitis was observed but in one case.

Bok, Berlin.

1a. Among other peculiarities of the epidemic of influenza in 1891 in Paris, LOEWENBERG has noticed an absence of the hemorrhagic forms of otitis which were common in northern Europe during the same period. He has resorted to trephining of the mastoid much less frequently than his German confrères, and has succeeded in curing many cases which had all the symptoms of brain complication. Among the other specific features of the epidemic was an acute otitis cured often by a single inflation with a Politzer bag, and a suppurating otitis media with a peculiar form and course of tympanic perforation. The perforation is pyriform and its apex is towards the head of the malleus, the end of the handle lying in the larger parts of the opening.

SWAN M. BURNETT.

2. LANNOIS in this paper discusses the aural complications in the course of leucocythæmia founded on the observation of nine cases, one of which has not been heretofore published. He arrives at the following conclusions: Leucocythæmia may be associated with symptoms and disturbances of the ear. The observed phenomena consisted in uni- or bilateral deafness with or without subjective noises and vertigo, or in the appearance of a very marked and complete Ménière's disease. This difference of the symptoms is due to the fact that the lesions do not always attack the same portions of the hearing apparatus. They may affect the tympanum only (Gradenigo), the tympanic cavity and the labyrinth (Steinbrügge), or the labyrinth only (Poltzer,

Steinbrügge, Lannois). In four out of five cases the anatomical lesion was a hemorrhage. In one case (Politzer's), a genuine leukæmic neoplasm was found. These complications are quite rare, which is explained by the fact that they are found only in patients with more or less previous disturbances of the ear.

G. GELLÉ, Paris.

3. SZENES used cocaine and bromethyl against tinnitus without success. He has obtained satisfactory results in suppurations of the ear with aristol and dermatol.

POLLAK, Vienna.

4. EITELBERG reports the following cases: 1. Amnesia following paracentesis of the membrana tympani. 2. Spontaneous absorption of a considerable serous exudation of the tympanic cavity. 3. Two cases of meningitis cerebro-spinalis without connection with an aural affection.

POLLAK.

4a. MAX reports beneficial results from the use of Lucae's elastic pressure probe in the treatment of otalgia tympanica.

POLLAK.

5. The injury was produced by puncture with a pipe-tube, which penetrated the membrane below the handle of the malleus. Otorrhœa, hemiparesis of the lower and upper extremity rapidly set in. The patient died comatose a few days after the injury. The autopsy did not reveal any pus in the cells, the petrous bone, nor in the cavity of the skull, but a softened area in the island of Reil about the size of the head of a mouse.

POLLAK.

6. Reprint from Scheff's *Text-book of Dentistry*, written for dentists. POLLAK energetically opposes the still prevailing wrong view of the etiological relation of the teeth to accidental affections of the ear during reactions.

7. MCBRIDE points out that true retention-cysts of the tonsils are of very rare occurrence. They are distinguished from mere collections of secretions by being covered by a layer of mucous membrane with a delicate vascular network upon its surface. The cysts contain a cream-like, odorless fluid. McBride reports two such cases. Cysts are much more common in the nose and in the larynx, especially in the latter situation. Small cysts in the external auditory meatus are of extreme rarity. One case is given in which the cyst was attached to the upper and anterior part of the osseous meatus and contained serous fluid.

8. CHARAZAC gives a brief historical synopsis of the literature upon malignant tumors of the ear. These are generally very

rare and occur almost invariably during the advanced ages. The malignant tumors are distinguished histologically as carcinomata and sarcomata, the latter being of much more frequent occurrence. The symptoms, prognosis, and treatment differ according to the seat (auricle, external meatus, middle and inner ear). The carcinomata of the middle ear are distinguished by intense hemorrhages, profuse otorrhœa, partly with necrosis, extreme deafness, and pain. They may extend to adjoining organs and thus produce the most varied complications, as facial paralysis, respiratory and nutritive disturbances, etc. The prognosis is absolutely unfavorable. The malignant tumors of the inner ear are always secondarily transmitted from the middle ear or the cerebrum. Primary carcinoma of the labyrinth has not been as yet positively determined as such. Fibro-sarcoma occurs most frequently upon the acoustic nerve, the main symptom being deafness. The other adjoining central nerves were subsequently implicated. These conditions are illustrated more fully by the author by nine histories of cases. BOK.

INSTRUMENTS AND METHODS OF EXAMINATION.

9. DELSTANCHE. Presentation of instruments (Présentation d'instruments). *Réun. des laryng. belges in Liège*, 1892, June 5th.

10. KOEHLER, Posen. Furunculotome for the external auditory meatus. *Monatsschr. f. Ohrenheilk.*, etc., 1892, No. 3.

11. LAURENT (Trépano-ponction de l'antre pétreux chez l'enfants.) Trephining of the petrous antrum in the infant. *Réunion de laryng. et d'otolog. belges in Liège*, 1892, June 5th.

12. CHOLEWA, Berlin. Instruments for the application of trichloride acetic acid in the nose and ear. *Monatsschr. f. Ohrenheilk.*, etc., 1892, No. 2.

13. SPEAR, E. D. A new aural forceps. *Trans. Amer. Otolog. Soc.*, 1891.

14. JACOBSON, L., Berlin. Some new apparatuses and instruments for galvano-cautery and electric illumination. *Berliner Klin. Wochenschrift*, 1892, No. 13.

15. POLITZER, A. Experiment with the tuning-fork for determining the patency of the Eustachian tube. *Wiener medizinische Wochenschrift*, 1892, No. 26.

16. KAYSER, R. Contribution to the technique of examination of bone-conduction. *Monatsschr. für Ohrenheilkunde*, etc., 1892, No. 3.

17. LANGE. Can the microphone be advantageously used for the construction of an apparatus for the improvement of hearing? *Deutsche med. Wochenschr.*, 1892, No. 15.

18. JANKAU, LUDWIG, Zurich. A new method of examination for differential diagnosis of affections of the labyrinth and middle ear. *Deutsche med. Wochenschr.*, 1892, No. 10.

19. KRZYWICKI, VON, Berlin. Contribution to the study of the differential diagnostic importance of the examination of the hearing function with the tuning-fork. *Berl. klin. Wochenschr.*, 1892, No. 12.

9. DELSTANCHE presents the following instruments: 1. Elastic catheter with metal mandrin. 2. Cotton holder for gradual enlargement of nostrils. 3. Obturator of the external meatus. 4. Instrument for removal of cristæ of nasal septum, scissors-like, one arm with indented, the other with cutting edge. 5. Modification of rarefactor.

SCHIFFERS, Liège.

10. KOEHLER's furunculotome is bent at an angle and is furnished at the anterior end with a lancet-like spine directed downward.

KILLIAN.

11. LAURENT uses for opening the mastoid process of children, an exploratory needle with double canula: the inner, being obliquely cut off, penetrates the bone; the outer serves as a drainage tube.

SCHIFFERS.

12. CHOLEWA has furnished Hartmann's nasal and aural probes anteriorly with an ear, for the better attachment of the crystals of fused trichlor-acetic acid.

KILLIAN.

13. SPEAR has devised a short, strong forceps body to which can be attached slender ring or serrated forceps or even a delicate pair of scissors. This secures strength and delicacy.

SWAN M. BURNETT.

14. JACOBSON ordered cheap and transportable storage batteries of well-known firm of W. A. Hirschmann (Berlin). He recommends for galvano-cautery and electroscope a primary battery, weighing 7 kilogrammes, at the price of about 17 dollars, sufficient for not too extensive use; laryngologists need a larger one. Jacobson has somewhat improved Dr. Kuttner's forehead lamp and has devised galvano-caustic burners, which are made aglow at the end only, an advantage over those used heretofore, principally in operations of the ear and larynx.

RUMLER.

15. The tuning-fork C, = 512 vibration, placed when struck before the nostrils, was normally perceived much more intensely in

either ear during the act of deglutition. In unilateral middle ear affection with impermeability of the Eustachian tube the tuning-fork, when placed in front of the nostrils, is perceived in the normal ear, but the sound is intensified in the diseased ear after opening of the Eustachian tube. In unilateral affections of the middle ear with permeability of the tube the tuning-fork is perceived much more intensely in the diseased ear. In persistent perforations and cicatrices of the membrana tympani, the intensification of the sound of the tuning-fork may be objectively determined by combining the experiment with the act of deglutition. In unilateral affections of the labyrinth the tuning-fork held in front of the nostril is perceived under all circumstances only in the normal ear.

POLLAK.

16. The tuning-fork is placed in the centre of a wooden staff (sound-conducting staff), against the end plates of which the examining and the examined persons press their mastoid processes in such a manner as to hear simultaneously by bone-conduction. The error of unequally striking the tuning-fork in successive examinations of the normal and diseased ear is thus avoided, also the error of unequal pressure in repeated placings of the tuning-fork upon the bone, and finally the loss of time. The instrument is manufactured by Haertel at Breslau.

KILLIAN.

17. Spurred on by the prize offered by the Baron Léon de Leuval at Nice: "For the construction of the best and most portable apparatus made according to the principle of the microphone for the improvement of the hearing power of deaf persons," LANGE made careful and troublesome investigations with the result that the chosen principle of the microphone is *not* suitable for an apparatus for improving the hearing power. The author assures that the microphone—no matter upon what system it is constructed—is no intensifier of sound, as is wellnigh generally assumed, but only a transmitter, unable to impart a greater intensity to words, sounds, or noises.

NOLTENIUS, Bremen.

18. JANKAU's new method of examination consists in auscultation of the vibrating tuning-fork which is placed upon the skull.

19. KRZYWICKI's patient contracted concussion of the brain with aphasia and deafness in the right ear, by the falling of a board upon the region of the left temporal lobe. The sounds of the tuning-fork by bone-conduction from all regions of the head are heard in the right ear only.

EXTERNAL EAR.

20. HAUG, Munich. Perichondritis tuberculosa auriculæ. *v. Langenbeck's Archiv*, vol. 43.

21. LABRAND, Lille. A method of treating the cysts of the auricle (Sur un procédé de traitement des cystes du pavillon). *Revue mens. de laryng.*, etc., 1892, June.

22. CHOLEWA, Berlin. Further experience with menthol in otitis externa furunculosa and otitis media purulenta acuta. *Monatsschr. f. Ohrenheilk.*, etc., 1892, No. 3.

23. BARR, THOMAS. Aural exostosis removed with the electric snare. *British Med. Journ.*, 1892, July 2d.

24. JOHNSON, WALTER B. Abnormal living entozoa in the human ear. *Ophthalmic Record*, 1892, January and February.

25. HOUGHTON, HENRY C. The artificial membrana tympani considered as a splint or crutch. *Journ. of Ophth., Otol., and Laryng.*, January, 1892.

26. THEOBALD, SAMUEL. Some partially successful attempts to promote the healing of old perforations of the tympanal membrane. *Trans. Amer. Otol. Soc.*, 1892.

27. SHEILD, A. MARMADUKE. Removal of a mass of lead from the tympanic cavity by means of metallic mercury. *Lancet*, 1892, April 20th.

28 and 29. GOMPERZ, B. Contribution to the study of regeneration of the substantia propria in cicatrices of the membrana tympani. *Monatsschr. f. Ohrenheilk.*, etc., 1892, No. 4.

20. HAUG has observed four cases in tuberculous persons of perichondritis of the auricle, which are clinically distinguished (principally by offensive disintegration of the diseased tissue, by infiltration of the adjoining glands, and by the proneness to ulceration) from the ordinary forms and in which the diagnosis of tuberculosis was ascertained by the microscopical examination of detritus and of excised portions of tissue. The author believes that the tuberculosis was only local and produced by inoculation. The treatment consisted in extensive opening, in excision of implicated glands, and dressing with gauze imbued with peru balsam or with iodoform. The prognosis is favorable, although the auricle remains considerably disfigured. ZARNIKO, Berlin.

21. LABRAND agrees with Hartmann's view, that the aural cysts proper have nothing in common with othæmatomata. He

recommends for treatment the galvano-caustic puncture of the cyst and burning of its inner wall, thereby producing firm adhesion without the deformity, the cicatrix excepted. Bok.

22. CHOLEWA, in aural furuncles, introduces a ten per cent. solution of menthol oil, by means of cotton pellets, into the external meatus, and continues this treatment for a week. The pain is relieved on the first day, when the external meatus becomes swollen. Relapses fail to appear. Incisions are required in furuncles situated outside or close to the introitus auriculæ. Acute otitis media is at first treated with ten per cent. solutions of carbolyzed glycerine. Cholewa, in purulent exudation, performs the paracentesis after disinfecting the external auditory meatus with lysol, irrigates the tube and middle ear with solutions of table salt, blows into the middle ear a few drops of ten per cent. solution of menthol oil, and plugs the entire external auditory meatus with dry cotton impregnated with mentholized glycerine. This last is daily renewed, and antiseptic dressing placed over it. The suppuration is rapidly diminished under this treatment, swellings in the external meatus are reduced, and recovery takes place in about a week. Treatment with menthol is very successful, because it renders the staphylococcus pyogen. aureus (according to Roenik?) and the streptococcus pyogen. (according to Roenik and Troie) incapable of development.

KILLIAN.

23. BARR's patient was a female, aged twenty-four. A white, firm, rounded body was seen just inside the left meatus, attached apparently to the back wall of the canal at about the junction of the bone and cartilage. While firm, it had not the ivory hardness of many of the exostoses found in this position. The symptoms were such as to call for the removal of the tumor without delay, and the patient being anæsthetized, it was decided first to try the electric snare, which with some little difficulty was passed through the growth, and on turning on the current and exercising slight traction, the pedicle was severed. On examination, the tumor was found to consist of hard, dense bone with a thin layer of cartilage on the surface.

URBAN PRITCHARD, London.

24. JOHNSON reports a case of the grub of the meat fly found in an ear suffering from chronic otitis media purulenta.

SWAN M. BURNETT.

25. HOUGHTON believes that the cotton pellet, which he has

found superior to the rubber artificial drumhead, acts by the mechanical support it gives to the relaxed ossicles.

SWAN M. BURNETT.

26. After having tried unsuccessfully all the methods commonly used for healing old perforations of the membrana tympani, including the paper disc and cauterization of the edge of the perforation with nitrate of silver, THEOBALD has come to use simply a pledget of cotton anointed with vaseline, which is applied like an artificial membrane against the drum. He reports one case in which this succeeded after the other methods had failed.

SWAN M. BURNETT.

27. SHEILD'S case is unique and forms a valuable contribution to the subject of foreign bodies in the ear. A mass of molten lead accidentally fell into the ear of an old man seventy years of age, and every means attempted to dislodge it having failed, Sheild was contemplating detaching the auricle posteriorly and chiseling away the wall of the bony canal. Before performing this operation, however, it was determined to try the effects of subjecting the lead to the action of metallic mercury; this was accordingly done, the patient being kept on his side and his ear filled with mercury. This treatment was continued at intervals for, on the aggregate, sixteen hours, at the end of which time, the leaden mass, much reduced in size and corroded by the mercury, was easily removed with the syringe.

URBAN PRITCHARD, London.

28 and 29. GOMPERZ, at the microscopical examination of a completely newly formed membrana tympani, found the substantia propria with radiating fibres, but much denser than in the normal drumhead. He believes that these fibres had newly formed from the tympanic ring. In partial defects the new formation of the fibres of the membrana propria is rendered more difficult, to wit, in the centre of the membrana tympani and in the province of the light reflex, on account of the more unfavorable nutritive conditions due to the tension. Complete cicatrices of the membrana tympani were found, according to Gomperz, 20 times among 20,000 ear patients. These membranes resemble that of the tympanum in position, size, and color, present neither the handle nor the short process of the malleus, and are in some instances adherent to the promontory but frequently free and movable, yet thoroughly firm. Their curvature is in most cases of the shape of a cupola. They exhibit a tendency to dermatitides with the formation of cholesteatomatous plugs.

KILLIAN.

MIDDLE EAR.

30. SMITH, S. MACCUEN. Traumatic hemorrhage of the tympanum causing deafness, with subsequent restoration of hearing. *Annals of Ophthalm. and Otology*, January, 1892.

31. DELSTANCHE. Intratympanal injections of liquid vaseline (injections intratympanales de vaseline liquide). *Réunion de laryngol. et d'otolog. belges à Liège*, 1892.

32. MARTHA. Notes on two cases of otitis media purulenta containing the bacillus pyocyaneus in pure cultures. (Notes sur deux cas d'otite moyenne purulente contenant le bacille pyocyanique à l'état de pureté.) *Arch. de méd. expér.*, January, 1892.

33. CRÉVOISIER DE VOMÉCOURT, LIONEL DE. Contribution to the study of the part played by micro-organisms in purulent middle otitis and its complications from the mastoid. (Contribution à l'étude du rôle des micro-organismes dans les otites moyennes purulentes et leurs complications mastoïdiennes.) 1892, Paris.

34. THEOBALD, SAMUEL. An unusual form of dislocation of the malleus handle. *Trans. Amer. Otol. Soc.*, 1892.

35. MAX, EMANUEL. Critical remarks on the application of sodium tetraboricum in chronic aural suppurations. *Internat. klin. Rundschau*, 1892, Nos. 2 and 3.

36. GARNAULT, M. Therapeutic application of the soluble salts of bismuth, principally in otorrhœa. (Sur l'application thérapeutique des sels solubles de bismuth en particulier dans les otorrhées.) *Soc. Paris. d'otolog.*, March, 1892.

37. GARRIGAU - DÉSARÈNES. Scraping of the malleus in chronic otorrhœa. (Du grattage du rocher dans l'otorrhée chronique.) *Revue mens. de laryngol.*, etc., 1892, No. 11.

38. ROHRER, ZURICH. Contribution to the pathology of cholesteatoma of the ear. (Contribution à la pathologie du cholestéatome de l'oreille.) *Ibid.*, No. 7.

39. WILSON, F. M. Three cases of acute suppurative otitis with complications and one death. *Trans. Amer. Otol. Soc.*, 1891.

40. BLAKE, CLARENCE J. Mastoid cases. *Trans. Amer. Otol. Soc.*, 1891.

41. BACON, GORHAM. Notes on the use of the Leiter coil in the early stage of mastoid disease. *Trans. Amer. Otol. Soc.*, 1891.

42. BELT, E. OLIVER. Suppuration of the middle ear complicated with abscess of the neck, with report of a case. *Ophthalm. Record*, May, 1892.

43. KNAPP, H. Two cases of acute mastoid inflammation, both operated on. In one otorrhœa and fatal meningitis. Death, as shown by the autopsy, preventable. In the other the drum-head unbroken; perfect recovery. *Trans. Amer. Otol. Soc.*, 1891.

44. RAY, J. M. Acute suppuration of the middle ear; meningitis; death. Autopsy. No involvement of the temporal bone. *Trans. Amer. Otol. Soc.*, 1891.

45. RANDALL. A case of suppuration, exostosis, and otitic epilepsy; mastoid trephining, followed by fatal septic meningitis. *Trans. Amer. Otol. Soc.*, 1891.

46. MILLIGAN, WILLIAM. The treatment of attic suppuration by excision of the membrana tympani and auditory ossicles. *Lancet*, 1892, January 16th.

47. REINHARD. Contribution to the malleo-incudal excision. *Arch. f. Ohrenheilk.*, vol. xxxiii., p. 94.

48. BURNETT, C. H. Excision of the membrana tympani and necrotic malleus in four cases of chronic suppurative otitis media. *Trans. Amer. Otol. Soc.*, 1891.

49. STACKE. Further communications upon the operative exposure of the cavities of the middle ear after ablation of the auricle. *Berl. klin. Wochenschr.*, 1892, No. 4.

50. PEPPER. Diseases of the temporal bone. *Lancet*, 1892, March 5th.

51. HASSETT VAN. Clinical contributions to the opening of the mastoid process. (Bydrage tot de Casuistick der operatieve opening van den Proc. mastoideus.) *Proefschr.*, Leyden, 1891.

52. GRUENING, E. Notes on operations on the mastoid process. *Trans. Amer. Otol. Soc.*, 1891.

53. MOLL. Trephining of the mastoid process (Trépanation de l'apophyse mastoïde.) *Réunion de laryng. et d'otol. belges à Liège*, 1892.

54. HOFFMANN, E., Greifswald. Persistence of open osseous cavities lined with epithelium after trephining the mastoid process. *Deutsche med. Wochenschr.*, 1892, No. 6.

55. HECKE, Breslau. Contribution to the cure of metastatic pyæmia in diseases of the middle ear. *Arch. f. Ohrenheilk.*, vol. xxxiii., p. 141.

56. DEAN, H. P. Cerebellar abscess successfully treated by operation. *Lancet*, 1892, July 30th.

57. HAUSBERG, Dortmund. Contribution to sinus thrombosis. *Monatsschr. f. Ohrenheilk.*, 1892, No. 1.

58. PARKER, RUSHTON, Liverpool. Two cases of pyæmia following suppuration of the middle ear, treated by ligature of the internal jugular vein and cleaning out the lateral sinus with complete success in one of the cases. *Lancet*, 1892, January.

59. HESSLER, Halle. Extradural abscesses following otitis. *Arch. f. Ohrenheilk.*, vol. xxxiii.

60. HECKE, Breslau. Extradural abscess in the course of otitis media. *Arch. f. Ohrenheilk.*, vol. xxxiii., p. 137.

60a. POLO, Nantes. Trepanation of the skull and the mastoid process, in consequence of otitis media purulenta (trépanation du crâne et de l'apophyse mastoïde suite d'une otite suppurée). *Revue mens. de laryng., d'otologie, etc.*, 1892, No. 2.

30. In the two cases which SMITH reports there was hemorrhage filling the tympanic cavity. In the first case there was tinnitus, vertigo, and the usual symptoms of Ménière's disease and a year after the accident the mastoid was trephined but without effect. The general morale of the patient was very bad. Two years after the accident, Smith made a free opening into the drum-head and washed out the blood clot with complete relief to all the distressing symptoms. The patient now hears perfectly. The other case was of the same nature, but less severe, and the result of evacuation of the blood equally happy. SWAN M. BURNETT.

31. DELSTANCHE confirms his former communications concerning the use of pure or iodoformized fluid vaseline in chronic affections of the middle ear, and now uses this treatment also in acute painful middle-ear affections with exudations. In several instances the exudation was absorbed, in other cases the pain was relieved by the remedy, principally in influenza otitis.

SCHIFFERS.

32. MARTHA points out that the bacillus pyocyaneus seems to play a certain part in man, as follows from some observations, referring to the so-called pyocyaneous infection reported by Ehlers and Neumann (*Soc. biolog.*, 1890) and by Oettinger (*Sémaine médicale*, 1890, p. 38). These cases taken from human pathology, resemble to a certain extent the pyocyaneous infection, artificially produced in animals, principally in hares (according to Charrin). In addition, he reports two cases of otitis media, in which the bacillus pyocyaneus was found in pure cultures in the pus discharged from the tympanum. In fifty-one other cases of suppuration of the middle ear the presence of the bacillus pyo-

cyaneus could not be determined in the examined pus. Experiments to produce suppuration in the tympanum by means of pure cultures have not been successful. One of the patients was apparently tuberculous. The second did not present any signs of tuberculosis, but the pyocyaneous origin of his otitis media appears to be well established. GELLÉ.

33. LIONEL DE CRÉVOISIER DE VOMÉCOURT has written a full and elaborate paper on micro-organisms occurring in purulent inflammations of the middle ear and the mastoid process with special reference to acute infectious diseases. The most frequent bacterial species are : streptococcus, pneumococcus, Friedländer's bacillus, staphylococcus, and bacillus pyocyaneus. They may appear singly or combined. Streptococcus and pneumococcus play the most important part and produce the severest symptoms. In some acute infectious diseases the subsequent otitides take an especial clinical course, corresponding with the nature of their bacillus. In inflammations of the mastoid process the streptococcus has been found almost exclusively. The infection may develop from the external meatus, or the Eustachian tube, particularly from the circulatory or lymph system. With reference to the treatment, the author assigns a very prominent part to antiseptic and surgical procedures. BOK.

34. THEOBALD reports a case in which, in a patient affected with destruction of the posterior half of the membrana tympani, the handle of the malleus was completely separated from the head of the bone, remaining attached to the membrana tympani at its tip, the other end curving forwards and outwards into the auditory canal, the free end lying nearly in contact with the anterior wall of the meatus. It was not disturbed.

SWAN M. BURNETT.

35. MAX does not confirm Kasemann's praise of the extraordinary action of sodium tetraboricum, which, in its limited province, can be employed only where boric acid cannot be used as a powder on account of its difficult solubility.

36. The salts of bismuth have the advantage of not preventing the reaction of the soluble ferments. These substances appear according to GARNAULT to be much more efficacious than the ordinary antiseptics : acidum boricum, resorcine, creoline, argentum nitricum, etc. The salt of bismuth is an iodine compound with bismuth and potassium, of which five to six lukewarm drops (after preceding injections of water) are instilled into

the ear in a ten per cent. solution, to which a small amount of glycerine is added. If there be a painful reaction the solution may be diluted with $\frac{1}{4}$ part of water. GELLÉ.

37. GARRIGAU DÉSARÈNES recommends Meyer's procedure of scraping off the tympanic walls with a small curette, if the usual methods are without avail. If the mastoid cells are implicated, the mastoid process should be opened. The author mentions a few cases cured in this manner. GELLÉ.

38. ROHRER collates twelve cases of cholesteatoma of the ear. The cholesteatoma had developed in five cases apparently as a tumor of the external meatus, and also in four cases in the tympanum. In two cases a pseudoplasm, consisting of epidermal lamellæ, had formed in an accessory cavity of the tympanum and in the mastoid process. In one case a genuine cyst was found. In all cases this formation had followed an inflammation with subsequent profuse epidermal desquamation and proliferation. BOK.

39. In the one fatal case of WILSON death was caused by cerebral abscess. The chief point of interest about the other two is that they were benefited or cured by going to Florida, and had relapses on return to a northern climate.

SWAN M. BURNETT.

40. During the last year BLAKE has seen 30 mastoid cases, 23 of which came to operation. The clinical history of each case is given in full. Of the operated cases 1 healed in 6 days, 1 in 7, 1 in 9, 1 in 11, and 3 in 13 days. There was one fatal case. All the operations were done under ether and the strictest antiseptic precautions.

SWAN M. BURNETT.

41. BACON has not had an extensive experience with the use of cold by the Leiter coil in beginning mastoid inflammation, but in all the cases in which he has used it it has been very satisfactory.

SWAN M. BURNETT.

42. In BELT's case a man of fifty-three years, who drank hard, was taken with the grippe, attended with acute otitis media purulenta with perforation of the drum. Six weeks later there was still discharge and slight swelling about the ear, and in a few days after there was a swelling along the cleido-mastoid muscle about two inches below the auricle. Temperature and pulse normal, and continued so to the end. Mastoid not red, swollen, or tender. The abscess in the neck was finally opened, and when the incision was made pus welled up into the meatus. The periosteum

of the mastoid was healthy, and the mastoid itself when opened was found to be normal. The patient died in a few days from exhaustion apparently. No autopsy was obtained.

SWAN M. BURNETT.

43. KNAPP'S cases were as follows: Case 1. A man of twenty-six had had painful inflammations in left ear for 4 weeks before first seen, headache, some nausea, and especially giddiness and stupor. Intellect clear; discharge irregular but purulent. Temperature normal. Three days after, the mastoid being tender and swollen, the bone was chiselled, but no pus found. On the fifth day after, there was free discharge of pus from the wound, but his temperature was 100° . Twenty-three days after the opening of the mastoid he died comatose after convulsions. On autopsy a small abscess was found in the foramen lacerum posterius—and this could have been easily reached had the chiselling been extended 3 or 5 millimetres farther.

Case 2. A man of fifty-one years had acute mastoiditis interna with the membrana tympani unbroken, but red and bulging. There was headache and dizziness. The mastoid was swollen and tender. The bone was laid bare and an oblong cavity chiselled into it. The outer cortex was compact and very vascular and there was a certain number of small polypoid excrescences or granulation tissue in the air spaces. The patient lost his pain from the moment of the operation and the case ended in perfect and permanent recovery.

SWAN M. BURNETT.

44. RAY'S case was a woman of forty-seven who had a typical otitis suppurativa acuta of the right ear which ended in death in ten days. On autopsy the mastoid was found to be healthy and the roof of the tympanum intact. The pia was opaque and the sulci filled with greenish pus. The meningitis was most apparent over the convexity of the anterior lobes.

SWAN M. BURNETT.

45. RANDALL'S case was an alcoholic of thirty years, who had had an incessant otorrhœa from the left ear, caused by scarlatina since childhood. Hearing was practically lost. Recently there were epileptic attacks beginning with aura in that ear. There was an exostosis of the meatus and a collection of cholesteatoma was suspected and the mastoid trephined, but nothing abnormal was found. Good communication with the antrum and throat was established. Fifteen days later, symptoms which proved to be those of pyæmia set in and the patient died. Autopsy revealed a meningitis which could not be connected with the ear trouble and which was prob-

ably due to absorption from the wounded bone. The epilepsy he thinks was reflex, due to a localized carious inflammation in the tympanum. Short notes of other similar cases are given.

SWAN M. BURNETT.

46. After an elaborate summary of the literature of the subjects, Milligan cites four cases in which he had himself adopted this procedure, and in all of these there was improvement.

URBAN PRITCHARD, London.

47. REINHARD recommends the excision of malleus and incus for the cure of chronic suppuration of the attic, without consideration of the still existing hearing power. The affection of the head of the malleus may be diagnosed from the quality of the secretions, exhibiting the signs of bone suppurations and retention of pus, and above all from its discharge from a tiny, high situated fistula. The diagnosis is strengthened by the picture of the drum-membrane, corresponding with that of malleus caries given by Politzer with extensive or total defect of the membrana tympani. Furthermore, the perforation of the membrana flaccida, frequently very small, with otherwise intact membrana tympani, is characteristic of the affection. Repeated proliferations of granulations at the place of perforation insure the diagnosis of caries of the head of the malleus. There may also be found a *newly formed* drum-membrane, which has formed after the suppuration in the tympanum has come to a standstill. "This membrane is distinguished from the original by the absence of light conus, by anomalies of tension, and by a peculiar gloss; in most cases the handle of the malleus is missing, not unfrequently appearing as a white band running from the barely visible short process downwards." With reference to the treatment Reinhard says that "even the most careful treatment of suppurations of the attic is without avail, unless the narrow passages for the efflux of pus from the upper part of the tympanum are enlarged and all diseased portions of bone are removed as well as possible." Reinhard has performed the excision of the malleus in 30 cases, in 7 of which the mastoid affection was present. In the remaining 23 cases, in 16 of which the incus was also removed, 15 recovered, viz., the ear remained dry during at least six months. The patients remained in bed 1 to 2 days only. In the first week irrigations were made with 2 to 3 per cent. solutions of carbolic acid or with sublimate of $\frac{1}{2}$ -1 : 1,000; the ears were dried and dressed with iodoform gauze. Vertiginous attacks, facial paralysis or other

accidents have not been observed after the operation of the 30 cases. In the majority of cases cicatrization of the wound took place after 8 to 21 days ; if the suppuration did not discontinue, irrigations were made with Schwartz's small antrum tube. The frequent headaches associated with suppurations of the attic disappeared after the operation if no other complications were present. Reinhard considers Schwartz's method when compared with Stacke's, "as the simpler, less complicated, less serious, and much milder measure." "The 15 recoveries among 23 cases encourage me to *continue* the performance of malleo-incudal excision in all cases of chronic suppurations of the middle ear with probable caries of the first two ossicles and affection of the attic *without* mastoid complications (viz., also without fistulæ in the posterior-upper wall of the external auditory meatus and without bulging of the latter." If after a long period it is impossible to cure the case in this manner or in disease of the mastoid process, Stacke's operation may be performed in addition to Schwartz's typical chiselling.

48. In all of BURNETT'S cases the usual routine treatment for chronic suppurative tympanic disease had been tried before operation was resorted to. All the operations were done under ether and the illumination was by means of the electric head lamp. In the first case the suppuration was checked in nine months ; the hearing was not impaired. In the second the hearing was improved, but the discharge has not been checked. In the third case attic suppuration and cholesteatomatous collections were checked at once and there has been no return. Hearing improved from 0 to 2 feet. On the fourth case discharge was checked in two months and hearing advanced from 18 inches to 6 or 8 feet.

SWAN M. BURNETT.

49. "The idea of extensive exposure of the attic by chiselling off its outer and lower wall in incurable suppurations of the upper cavities of the tympanum, was originated from the unsatisfactory or rather isolated results reached by the mere removal of malleus and incus." In order not to operate in the dark, the auricle was ablated and the auditory meatus transversely severed ; thus it was possible to follow the suppuration from the membrana tympani into the cavities situated above the external meatus. STACKE originally confined himself to the exposure of the attic, then replaced the meatus in its former position and had the satisfaction of closing the external incision per primam and also

to reunite the meatus without stenosis. He soon discovered, however, that the suppuration was rarely confined to the tympanum only. He succeeded almost invariably (29 times out of 30 cases), during the operation, in recognizing or excluding the participation of the mastoid antrum in the suppurative process by means of the probe. "Stacke then, during the same narcosis, extensively opened the antrum and its aditus. He convinced himself in more than 30 cases that one should always succeed, by this typical operation, in opening all accessory cavities of the tympanum safely and without danger. Stacke reached the following results: 19 of 33 cases recovered, 2 improved cases underwent other after-treatment, 2 stayed away, 9 remained under treatment and 1 died from diabetes mellitus, not recognized before operation." The average duration of treatment lasts four months. The hearing power was in most cases somewhat improved, generally not essentially altered, but never impaired.

RUMLER.

50. PEPPER'S paper is a very good summary of the causes and effects of disease of the middle ear and of the adjacent structures. He considers that suppuration of the mastoid cells is one of the most common of preventable deaths, and that so long as a perforation of the tympanic membrane remains with discharge, however slight, there is an abiding cause of possibly fatal issue. In discussing the complications of chronic mastoiditis, allusion is made to the occurrence of facial paralysis, deep suppuration in the neck, recurrent external mastoid abscesses, necrosis of the posterior wall of the meatus, implication of the posterior wall of the meatus, implication of the temporo-maxillary joint, and sclerosing otitis of the mastoid bone. Interesting cases are cited to illustrate these points.

URBAN PRITCHARD, London.

51. Symptoms of cerebral abscess or meningitis are counter indications to the opening of the mastoid process. The affection was primary only in one case in consequence of tuberculosis, 11 chisellings were made after otitis media acuta, 12 after otitis media chronica. Nine operations were performed on account of osteomyelitis acuta, whilst in 14 cases the operation was indicated by chronic inflammation with caries of the mastoid process. In 14 cases abscesses had developed upon the process and in 4 cases the abscess had opened spontaneously. Recovery took place in 23 cases. Two deaths, one of which with meningitis from perforation of the empyema into the middle cerebral fossa,

another with pyæmia, which had developed before the operation, but had been operated upon against the author's principles.

POSTHUMUS MEYJÈS.

52. In three years GRUENING has operated forty-seven times on the mastoid. Thirty-nine of these cases were for acute caries or empyema of the mastoid with profuse purulent discharge through the middle ear. In two cases the cortex of the mastoid was intact without purulent discharge through the middle ear. In three cases there was chronic otitis media purulenta with cholesterine masses in the antrum and tympanic cavity. There was chronic otitis media purulenta with sclerosis of mastoid cells, thrombosis of the lateral sinus, and pyæmia in two cases, and chronic otitis media purulenta with sclerosis of the mastoid and abscess of the brain in one case. Gruening modifies Schwartz's operation by removing the whole of the external wall of the mastoid process. The cavity is then packed with iodoform gauze and a bandage applied. Neither the ear nor the wound is syringed. Even large incisions over the mastoid may be closed immediately after the operation. Forty of the cases remained aseptic during the time of healing, which averaged about four weeks.

SWAN M. BURNETT.

53. MOLL, in a case of influenza otitis, was compelled to chisel both mastoid processes.

SCHIFFERS.

54. HOFFMANN has observed in three cases among about fifty openings of the mastoid process, fistular formations behind the ear. There also existed at the bottom a wide communication between the external auditory meatus, or rather the middle ear, and the cavity of the mastoid process. Through this opening the epithelium of the external meatus or middle ear has immigrated into the mastoid antrum, and thus prevented the osseous wound from filling up with granulations and cicatricial tissue. The author, moreover, believes that no communication ought to be made between osseous wound and middle ear or external meatus through the operation, since the healing process is thus retarded.

NOLTENIUS.

55. HECKE successfully operated two patients with severe pyæmia. Case 1.—Pupil, aged seventeen. On the day subsequent to the removal of a polypoid granulation of the tympanic mucous membrane, chills, high temperature, and sensitiveness to pressure upon the mastoid process developed. On chiselling with an extensive opening of the antrum the fever abated. On the

fourth day after operation pleurisy of the left side set in, followed after a few days by purulent inflammation of the left sterno-clavicular joint, and then by pleuritis dextra and inflammation of the right shoulder-joint. "After twelve weeks complete recovery took place with excellent hearing power; watch, $\frac{1}{2}$ metre, and for whispered numbers, 6-7 metres." Case 2.—Merchant, æt. eighteen, occasionally catheterized for catarrh of the right tympanic cavity, was suddenly attacked by severe suppuration of the right ear. After five days high fever and chills set in, and the mastoid process became sensitive on pressure. The cortex was found on chiselling to be hardly altered, but the cells imbued with pus. The fever abated. After a few days chills reappeared, swelling and cutaneous reaction of the right elbow-joint, which discharged on opening a serous turbid fluid containing the streptococcus pyogenes. Recovery took place after four months. Hearing power restored to that before operation. Hecke found two weeks after opening of the elbow-joint, in the suppurations from the opening in the mastoid process, still the streptococcus pyogenes and the staphylococcus pyogenes albus, the patient being without temperature.

RUMLER.

56. DEAN's patient was a female, aged fourteen, with a history of left otitis media for five years and symptoms of cerebral disturbance for three weeks. No relief following the free opening of the mastoid cells by means of a single skin incision behind the ear, the soft parts were reflected and a trephine applied one inch behind and half an inch above the centre of the opening of the external meatus. The dura mater being then opened, the cerebrum was punctured in half a dozen different directions, reaching so far inwards as to tap the ventricles, but no pus escaped. The trephine opening was then enlarged in a direction downwards and backwards, the lateral sinus exposed and explored, and finally the cerebellum, and in this last situation the seat of the collection of pus was tapped, and upwards of an ounce escaped. The patient subsequently made a good recovery. Dean points out that, if the proper position is chosen, *i. e.*, just over the lateral sinus, it is possible at one sitting to explore not only the sinus itself, but also the parts below as well as those above the tentorium.

URBAN PRITCHARD, London.

57. A patient, aged sixteen, who had suffered for years from diarrhœa, was seized with inflammatory symptoms from the left ear, vomiting, chills, delirium, and somnolence. Swelling and

pain were missing from the mastoid, but the latter existed in the retromaxillary region. In chiselling of the mastoid process and laying bare the attic after removal of the posterior wall of the external osseous meatus, a sclerosed spot, three *mm* wide, was found upwards and backwards in the bone, after the removal of which with the chisel profuse purulent fluid escaped under strong pulsations. It emanated from the transverse sinus, which was therefore extensively exposed and principally laid bare inferiorly by the chisel. In spite of the favorable course taken in the beginning, the patient died on the 56th day from pyæmic processes of the pleura, peritoneum, and left shoulder-joint. The autopsy, which was confined to the head, revealed complete thrombosis of the transverse and superior petrosal sinuses. The wall of the superior longitudinal sinus was much thickened. At the place of suppuration of the thrombus of the transverse sinus a basin had formed in the dura mater and rarefaction had taken place in the occiput. The presence of a sequestrum, 6 *mm* wide, in the roof of the antrum, without corresponding affection of the dura at this place, is worthy of note.

The thrombosis of the transverse sinus just reaching the jugular foramen, no swelling of the internal jugular vein could be felt in the neck.

HAUSBERG recommends an earliest possible operation, which has to begin with chiselling the mastoid process. KILLIAN.

58. PARKER's patient, aged twenty-five, with offensive otorrhœa, was seized with pain and chills, vomiting, vertigo, occasional delirium. Furthermore bilateral neuritis optica, swelling and increased sensibility in the neck below the mastoid process developed. The symptoms persisted and increased, so as to necessitate the exposure of the jugular vein and mastoid process. The vein was found to be obstructed, was doubly ligated and excised. The mastoid process was filled with offensive pus, the sinus exposed. The vein was irrigated, but the sinus was plugged since blood escaped when opened.

In another case the sinus was also opened, but meningitis rapidly set in, to which the patient succumbed.

59. HESSLER has collected from literature 50 cases of genuine extradural abscesses, principally to ascertain: where is the most frequent seat, and what anatomical changes are found in the temporal bone, which have preceded the subdural abscess and have favored its development? Hessler has observed three cases.

"The extradural abscesses are of the same frequency in either ear, in the male more than twice as frequent as in the female, and principally from the first to the twenty-first year of age." Those cases in which the inflammation had been transmitted from the cavities of the middle ear to the bone and upward below the dura mater, are called by Hessler secondary extradural abscesses, in contra-distinction to the primary, in which no fistular communications existed between the cavities of the middle ear and the abscesses.

Among 53 cases 41 were secondary and 12 primary.

"With reference to the seat of the extradural abscesses, the carious fistula of the bone was found as follows :

"25 times upon the posterior surface of the petrous bone ;

"6 times upon the tegmen tympani ;

"1 each upon the anterior and upon the anterior and posterior wall ;

and in 8 cases the seat could not be recognized from the description."

The extent of caries of the petrous bone differed widely.

In 14 cases of secondary extradural abscesses recovery took place by operation, and in the 27 remaining cases death ensued, *i. e.* :

6 times from cerebral abscess ;

4 times from meningitis ;

3 times from cerebral abscess and sinusphlebitis ;

twice each from empyema of the pleura and sinusphlebitis with metastases ;

once each from meningitis with metastases, tuberculosis, cerebral oedema, dysentery ;

and in 6 cases the cause could not be recognized from the description.

In addition to the 10 cases of primary abscess from literature, Hessler reports two cases of his own observation.

In both cases recovery took place after operation.

Among the 12 abscesses were :

6 upon the posterior surface of the petrous bone ;

2 upon the interior surface of the petrous bone ;

1 upon the tegmen tympani, and in

3 the seat was not obvious from the description.

In 3 cases recovery took place after operation.

Extradural abscess may develop in a threefold manner. The

suppuration of the middle ear is most frequently transmitted through the bone to the dura covering it.

Other abscesses are undoubtedly of periphlebitic origin. In the third series of cases the extradural abscess develops simultaneously with the suppuration in the middle ear, as the subperiosteal abscess in acute infectious otitis or osteomyelitis; Hessler ranks his two observations among the latter class.

Hessler could not uniformly depict the appearance of extradural abscess, neither could he safely establish the indications for its diagnosis, which can be only per exclusionem from general purulent meningitis, sinus phlebitis, and cerebral abscess.

The treatment is prophylactic, by preventing retention of pus in the ear; and surgical, by extensive opening of the abscess, disinfection, and drainage.

RÜMLER.

60. HECKE, at the time of the influenza epidemic of 1890, observed two cases with extensive collection of pus between bone and dura mater. Case 1: man, æt. thirty-three, was attacked in January by influenza and recovered after two weeks. In March headache in the right side, diminished hearing power. On May 9th: Sleeplessness for three weeks on account of right otalgia and headache. During the operation considerable amount of pus escaped from the fluctuating tumor situated behind the ear. No fistula being found in the mastoid process, the latter, of ivory hardness, was typically chiselled, $2\frac{1}{2}$ cm deep without opening the antrum. A tiny opening, situated $1\frac{1}{2}$ cm upward, and somewhat backward from the porus acusticus externus, is found, through which pus escapes from the cerebral cavity, and is enlarged $1\frac{1}{2}$ cm in diameter. After three days the opening was enlarged principally backward on account of retention of pus. On the sixth day after the first operation death ensued from meningitis.

The autopsy revealed no particular changes in the tympanum; in the antrum, which was occluded from the tympanum, circumscribed caries, of the size of a lentil, was found with granulations. The above-mentioned fistula led from the antrum through the tegmen tympani into the cerebral cavity.

Case 2: Man, aged fifty-two, was attacked toward the end of May with influenza, followed by hardness of hearing and pain in the right ear. On August 12th abscess behind the ear was opened. In the fossa temporalis, about $1\frac{1}{2}$ cm above the porus acusticus externus, the dura mater was laid bare, on account of caries necrotica, to the extent of 2 cm in length and $\frac{1}{2}$ cm in width. The

mastoid process, being carious only in the cortical plate, but sclerotic in the inner, was chiselled $2\frac{1}{2}$ cm. Paracentesis of the membrana tympani resulted in the discharge of slight mucous exudation. Recovery without fever. Towards the middle of October the patient was about to be discharged with superficially granulating surface of the wound, when he suddenly was affected with the symptoms of meningitis and died on the following day.

The autopsy revealed extensive purulent meningitis and considerable gathering of pus between dura mater and bone in the middle and posterior cerebral fossa.

RUMLER.

60a. POLO describes a case in which severe cerebral symptoms had appeared in consequence of otitis media purulenta. The diagnosis of cerebral abscess was made. The treatment consisted in trepanation of the mastoid process, and the skull in the region of the temporal lobe. In puncturing the temporo-sphenoidal lobe a small amount of pus was discharged. The symptoms did not disappear after the operation, and the patient died on the following day.

BOK.

NERVOUS APPARATUS.

61. HABERMANN, Graz. Diseases of the ear due to tabes. *Arch. f. Ohrenheilk.*, vol. xxxiii., p. 105.

62. ROHRER, Zurich. Torpor nervi acustici produced by salpingo-stenosis (Torpor nervi acustici produit par salpingo-stenosis). *Archivos Internat. de Rinologia, Laringol., Otol.*

63. GELLÉ. The aural sign in cerebral affections. (Le signe otique dans les maladies cérébrales.) *Annal. des mal. de l'oreille*, etc., 1892, May.

64. CHARAZAC, Toulouse. Some considerations of otitis interna syphilitica. *Revue de laryng.*, etc., 1892, No. 12.

65. TURNBULL, LAWRENCE. Deafness the result of the poison of syphilis. Its treatment by muriate of pilocarpine. *Annals of Ophthalm. and Otolog.*, 1892, January.

66. COHNSTÄDT, C. Contribution to the tuberculosis of the labyrinth. *Monatsschr. f. Ohrenheilk.*, etc., 1892, No. 5.

67. MILLS, C. K. The centre of hearing. *Brain*, January, 1892.

61. HABERMANN had the opportunity of examining a case of affection of the acoustic nerve in consequence of tabes clinically and pathologico-anatomically. We emphasize from the history of

the case the following points : Cook, æt. fifty-two, of sound constitution, was attacked 13 years ago with stinging pains in the left ear, rapidly followed by tinnitus, first in the right, then in the left ear. After a year complete deafness was suddenly noticed, which became permanent. Vertigo was not experienced, but later on signs of tabes. Shortly before death Habermann examined both ears of the patient and found bilateral complete deafness for the watch and voice. Low sounds of the tuning-fork (C) are still heard and repeated singing, but not the high notes.

At the autopsy both nn. acustici were found extremely altered, in as much as they appeared much thinner and of gray color. The microscopical examination of the cerebrum had the following result : Transverse sections of the pons and medulla oblongata made through the main nuclei of the acoustic nerves revealed these main and also the accessory nuclei to be intact, but the lateral and median acoustic roots extremely atrophied. The ascending acoustic roots were not altered. In the acoustic apparatus the following changes were found : The left middle ear was completely normal, the right showed acute inflammation, developed during the last weeks of the patient's life and having no causal connection with her deafness. Bilateral wellnigh complete atrophy of the nerve fibres of the ramus cochleæ, except a few fibres of the left side, with which an almost complete absence of nerve fibres of the cochlea corresponded. The ramus vestibuli was degenerated to a lesser extent. The same changes took place in the right ear, but not to such an extent. In the apex of the cochlea a bundle of nerve fibres was preserved and in the end portion of the basal turn a few ganglionic cells. The degeneration of the nerves must be brought in causal relation with the tabes : first, because there was no other cause for the atrophy of the nerves ; then, because the histological alteration corresponded with that observed in other nerves affected in tabes. At the conclusion, Habermann points out : "That, with the existence of hearing for low notes in otherwise complete deafness, the apex of the right cochlea contained a bundle of nerves although in degeneration, nevertheless still well preserved, in addition to completely preserved Corti's organs. This case, therefore, provided the patient's statements were correct, forms a new link in the chain of evidences for the support of the correctness of Helmholtz's theory of the function of the cochlea." Finally, with reference to the function of the two sacculi, we should take into consideration that, in spite

of the wellnigh complete deafness of the patient, a large portion of the nerves were still preserved in the sacculi and also in the ramus vestibularis.

RUMLER.

62. ROHRER describes a case of torpor nervi acustici in consequence of stenosis of the Eustachian tube, which recovered rapidly after treatment with inflation of air through the catheter. The diagnosis was supported by the following points: (1) severe deafness; (2) almost complete absence of bone-conduction; (3) localization of Weber's experiment in the ear with lesser deafness; (4) positive result of Rinne's experiment; (5) mobility of the membrana tympani and ossicles; (6) normal hearing for high notes (somewhat diminished in the more affected ear); (7) success of treatment.

GELLÉ.

63. GELLÉ has been induced by the symptoms of pachymeningitis corticalis to transfer the origin of the binauricular reflex of accommodation to the cervical medulla. He has since had two opportunities of observing analogous facts. One of his pupils has based a paper upon a case in which the phenomena of synergy were missing, although the organs and their functions were perfectly intact.

GELLÉ.

64. Syphilis extends in most cases to the ear from the Eustachian tubes, upon which mucous patches or gummous ulcers develop from the naso-pharynx. Syphilis of the labyrinth and the acoustic nerve may develop at the different stages without affecting other parts of the hearing apparatus, or it may be transmitted from the middle ear. Rapid development, in some instances in the course of several months, in others in a few days or even suddenly, is characteristic of syphilis of the inner ear. It is associated with deafness, appearing gradually or suddenly, remaining stationary for some time and becoming suddenly worse. In addition very violent headaches at times lessening in intensity and loud aural noises and vertiginous attacks are experienced. Ocular symptoms and facial paralysis (transmitted from the acoustic nerve) are also observed. At the conclusion the author propounds the hypothesis, that in syphilis cerebral affections are more to be dreaded, and occur more frequently, when the primary infection has appeared in the throat, the tonsils, the lip, or the palate.

BOK.

65. TURNBULL adds the weight of his experience to the value of hypodermatic injections of pilocarpine in cases of labyrinthine disease from syphilis.

SWAN M. BURNETT.

66. COHNSTÄDT's patient, a girl, æt. eleven, with otorrhœa of four years' standing, in whom during the last two years incisions into the swollen mastoid process were twice made, was attacked by an acute inflammatory process. The middle ear was filled with granulations; the discharge offensive and contained tubercle bacilli. There existed facial paresis without swelling of the mastoid process. The latter was chiselled off and also the posterior, completely carious wall of the external osseous meatus. The course of the affection was favorable in the beginning, but death ensued after two weeks. At the autopsy the tegmen tympani was found to be carious, and upon the labyrinthine wall of the tympanum a large carious defect, from which caseous suppuration extended over the entire pyramid of the petrous bone. The cochlea and ampullæ were replaced by bands of connective tissue. The facial canal was eroded by caries. There existed in addition purulent basal meningitis and a cerebellar abscess of the size of a walnut.

Cohnstädt has frequently found tubercle bacilli in suppuration from the tympanum in scrofulous individuals, and had observed early implication of the mastoid process, before it was pointed out by swelling and pain upon pressure. One ought not to delay chiselling such cases. KILLIAN.

67. MILLS gives a most careful and elaborate account of the clinical symptoms and post-mortem appearances of a case that had come under his notice, and he concludes therefrom, *inter alia*, that the centre for word-hearing is situated in the posterior third of the first and second temporal convolutions, and that destruction of the centre on both sides is necessary in order to abolish hearing entirely. URBAN PRITCHARD.

NOSE AND NASO-PHARYNX.

68. SCHMIDT, MORITZ. Sucking in of the alæ nasi. *Deutsche mediz. Wochenschr.*, 1892, No. 4.

69. STAUNNESHaus. Rhinophyma (elephantiasis nasi) of a Malay. *Geneesk. Tydschrift voor Nederl. Indic.*, xxxi.

70. ROHRER, Zurich. An additional case of rhinolithiasis. *Wiener klin. Wochenschr.*, 1892, No. 5.

71. MUSCHOLD, Berlin. A case of morbus Basedowii, cured by nasal operation. *Deutsche mediz. Wochenschr.*, 1892, No. 5.

72. GUÉMENT, M. A case of reflex of nasal origin. *Annal. de la Polyclinique de Bordeaux*, April, 1892.

73. ZIEM, Danzig. Intra-ocular affections following nasal diseases. *Münch. med. Wochenschr.*, 1892, No. 16.

74. BERGONIE and MOURE. Electrolytic treatment of deviations and cristæ of the nasal septum. *Arch. de chirurgie de Bordeaux*, 1892, Nos. 3 and 4.

75. CHATELLIER. Non-traumatic deviations of the nasal septum. Classification; embryology. General rules for treatment. *Soc. Paris d'otologie*, 1892, March 4th.

76. SUCHANNEK. Bilateral congenital osseous stenosis of the posterior nares. *Correspondenzbl. f. Schweizer Aerzte*, 1892.

77. LUC, Paris. Case of empyema of Highmore's antrum caused by streptococcus of erysipelas. *Deutsche mediz. Wochenschr.*, 1892, No. 8.

78. LEMELLETIER. Case of empyema of the left Highmore's antrum with offensive discharge. Opening of the sinus; recovery after 45 days. *Revue internat. de rhinol.*, etc., 1892, February.

79. KUCHENBECKER, AUGUST. Contribution to the etiology and treatment of empyema of Highmore's antrum. *Monatsschr. f. Ohrenheilk.*, etc., 1892, Nos. 3 and 4.

80. CHIARI, Vienna. The results of empyema of Highmore's antrum. *Prager med. Wochenschr.*, 1892, Nos. 22 to 29.

81. NATIER. Mucous polypi of the nasal fossæ in children up to the age of fifteen. *Annal. Polyclin. de Paris*, 1891, Nos. 7 and 8.

82. SUCHANNEK. Fibroma pendulum septi narium. *Correspondenzbl. f. Schweizer Aerzte*, 1892.

83. DREYFUSS. Epithelial malignant tumors of the nasal fossæ. *Arch. internat. de laryng.*, 1892, March and April.

84. HALBEIS, I., Salzburg. Adenoid vegetations of the nasopharynx. Munich, 1891.

85. ALBESPY, DANIEL. Adenoid tumor and hypertrophy of the turbinated bodies, causing cerebral stasis of circulation and conjunctival catarrh, without aural disturbances. *Revue mens. de laryngologie*, etc., 1892, No. 1.

86. WROBLEWSKI, L. Contribution to the study of adenoid vegetations. The vegetations in the deaf-mute. *Ibid.*, 1892, No. 9.

87. LAVRAND, Lille. Adenoid tumors. Two successive relapses in one case, and one relapse in another case. *Ibid.*, 1892, No. 11.

88. WAGNIER, Lille. Treatment of naso-pharyngeal fibromyxomata. *Ibid.*, 1892, No. 12.

89. MEYJES, POSTHUMUS W. Anatomical changes in the ethmoidal conchæ. *Nederl. Tydschr. voor Geneeskunde*, vol. xxvii., No. 13.

90. GERBER. Syphilis of the naso-pharynx. *Arch. of Dermatol. and Syphilis*.

91. LUBET-BARBON. Note on the treatment of Tornwaldt's disease. *Revue mensuelle de laryngologie*, etc., 1892, No. 5.

92. CAPART. The employment of electrolysis in naso-pharyngeal fibromata. *Réunion des laryngolog. belges*.

93. MOURE, I. Treatment of hypertrophy of tonsils.

94. ARBUTHNOT LANE. Hemorrhage following tonsillotomy. *Brit. Med. Four.*, 1892, June 24th.

68. SCHMIDT is justified in pointing out that the unpleasant inspiratory sucking in of the alæ nasi is at times so distressing as to make the result of rhino-surgical procedures, although successfully carried out, quite illusory. Feldbausch, at the author's suggestion, has constructed a small instrument, which may be worn continually without disturbance, and which answers its purpose. It pushes both alæ nasi apart without touching the septum, and is thus well borne.

NOLTENIUS.

69. In a Malay, aged fifty, a hard tumor gradually developed upon the nose, hanging after four years beyond the upper lip, to the great annoyance of the patient during meals. In the operation without narcosis the knife followed as well as possible the original form of the nose. Complete recovery took place after six weeks, and the nose became almost normal. The microscopic examination revealed hypertrophy of the cutis with newly formed blood-vessels and hypertrophy of the sebaceous glands.

POSTHUMUS MEYJES.

70. ROHRER's patient, from whom a rhinolith of the size of a hazel-nut was removed, suffered from permanent pains in the ear, and neuralgia of the fifth nerve over the entire side of the head, wry neck, fever, sleeplessness, and anorexia.

Wry neck disappeared after the removal of the rhinolith, but the neuralgia persisted.

71. MUSCHOLD adds to the literature a careful observation of his own. The well-known symptoms (apart from exophthal-

mus, which was absent in his case) improved or disappeared after the galvano-caustic removal of the posterior extremity of the lower turbinated body, which was not even extremely swollen.

NOLTENIUS.

72. GUÉMENT describes the case of a female with asthmatic attacks. At the examination of the nose the mucous membrane of the lower turbinated bodies and of the nasal septum appeared soft and impressionable, without being hypertrophied. Attacks set in immediately after examination with the probe. These places were cauterized, whereupon the attacks ceased for a longer period and returned later on less frequently. Pressure upon the gastric region also produced the attacks. Irrigations of the stomach for a long period had no effect. The observation of this case has not been concluded, since the patient moved away.

BOK.

73. Malignant tumor of the nose and naso-pharynx with implication of the regionary lymph glands. *Left*: protrusion of the eyeball. Sight destroyed. Congestion at and close to the disc. *Right*: extreme contraction of the visual field. Venous hyperæmia and tortuous vessels at the background of the eye. After irrigating through the nose and discharging of offensive pus, the R visual field becomes normal in a week. Death ensued in a few weeks.

The result of the irrigation compels ZIEM to the abandonment of the former supposition of retrobulbar neuritis optica, but rather to the probable view of congestion from the nose to the interior of the eye through the path of the abundant collateral channels (ethmoidal, infra-orbital, and naso-frontal.)

ZARNIKO.

74. BERGONIÉ and MOURE cite and criticise the heretofore used operative procedures (resection, operation with the chisel, saw, and drill) and finally discuss electrolysis.

Miot prefers the monopolar method with the indifferent electrode in the opposite nostril. Garel uses the monopolar method with one or more needles connected with each other. According to the authors these methods are to be rejected; they advise, however, the use of the bipolar method.

The physical part of the paper has been carefully elaborated by Prof. BERGONIÉ with great expertness.

GELLÉ.

75. There is, independently of the weak places of the nasal septum, situated at the level of the connection of the lamina perpendicularis and the vomer with the apophyses of the hard palate,

another weak place at the level of the central, stenosed portion of the lamina perpendicularis. These weak places may explain the deviations of the nasal fossæ. CHATELLIER's treatment differs according as to whether there is : (1) thickening ; (2) deviation ; (3) thickening and deviation of the septum. In the first case electrolysis and cutting forceps are best used. In the second case loss of substance causing perforation should be avoided ; straightening is of no avail. The vertical dimensions of the septum should be lessened, saving thereby the soft parts. The author used for this purpose a method of operation which he considered to have been first devised and employed by him (1883). It has been, however, described by Hartmann (1882) and later on by Petersen, A. O. It consists in the following procedure : after anæsthetizing with cocaine, the prominent side is incised near the floor. The periosteum and perichondrium are raised and the partition wall penetrated, avoiding perforating the opposite mucous membrane. After resection of the bony fragment, periosteum is applied to periosteum. The union becomes complete in 58 hours. The author has successfully operated five cases in this manner. In deviations with thickening the simple removal of the thickening, or Hartmann's method, should be performed according to the requirements of the case. GELLÉ.

76. SUCHANNEK had not to deal in his case with stenosis, but with complete occlusion of both choanæ. Both choanæ were occluded posteriorly by an osseous diaphragm. Operation with trocar after treatment by hard-rubber sounds introduced by the patient. The patient, aged eleven, was not hard of hearing. The sensation of taste was also well developed.

77. LUC, on account of his observation, has changed the heretofore prevalent and undoubtedly erroneous view, that empyema is always due to dental caries ; for the teeth of his patient were perfectly normal and the empyema originated from facial erysipelas. The suppuration, evacuated from an opening of the fossa canina accordingly contained a pure culture of streptococci. NOLTENIUS.

78. LEMELLETIER describes a case of empyema of the left Highmore's antrum following dental caries. After removal of the carious teeth, offensive pus escaped. An opening was made with the trocar in the region of the second molar tooth and the cavity irrigated with solutions of sublimate (1 : 2000). A canula was afterward introduced into the opening. Recovery took place in 45 days, after previous removal of the canula. BOK.

79. KUCHENBECKER fully reports 31 cases of suppuration of Highmore's antrum, observed by Siebenmann in dispensary and private practice. He points out that infectious diseases frequently cause empyema of the antrum maxillare, which probably recover, as a rule, spontaneously. In 5 cases of influenza the symptoms of suppuration of Highmore's antrum were noticeable from the first day. Pneumonia is to be considered as the cause of one case. Siebenmann preferred the drilling from the alveolar process by means of his double-edged gimlet-like trocar, and kept the opening open in a portion of his cases by means of a silver nail-like obturator. Among 5 acute cases of empyema, 4 recovered, and 14 among 24 chronic cases, one of these spontaneously. We emphasize the result of pathologico-anatomical examinations of the sphenoid antrum as follows: Siebenmann found the sinus sphenoidalis affected in a number of autopsies of influenza, in 3 of typhoid fever, and also in cases of vitium cordis, pleurisy, pericarditis, pneumonia, phthisis pulmonum, etc. In the cases of influenza the mucous membrane was highly swollen, gray, smooth or uneven, and in some instances fungous. The epithelium was found in sections to be exfoliated at places or swollen and in mucous degeneration, the mucosa with imbued serum, the submucosa loosened with formations of fissure or cyst like cavities. In the deeper layers of the mucous membrane numerous colonies of cocci were discovered.

KILLIAN.

80. CHIARI bases upon 21 new and 7 old observations the following rules for the treatment of empyema antri Highmori:

1. In very rare cases empyema caused by periostitis of the root may be removed by the extraction of the root only.
2. Regular irrigations of the nose may improve it considerably.
3. Injections into the antrum do not frequently lead to recovery, though usually to improvement.
4. In fresh suppurations, caused by periostitis of the dental root, a few injections usually produce recovery.
5. Successful injections through the ostium maxillare were made only in one case.
6. Systematic injection can easily be carried out from the alveolar opening.
7. Insufflations with iodoformized powder do not yield positive results.
8. The safest results are reached by plugging with iodoformized gauze.
9. For the purpose of plugging, an opening, 4 to 6 mm wide, is usually made from an alveolus, but less frequently from the fossa canina.

POLLAK.

81. It follows from NATIER'S paper that mucous polypi do not present any peculiarities in children. Diagnosis and treatment do not differ from that of adults. According to this paper mucous polypi seem on the whole to be of rare occurrence in children; for the author could not collect but 21 cases, of which several had not been heretofore published. Among this number were two cases which were observed in the new-born.

GELLÉ.

82. SUCHANNEK discovered upon the nasal septum of a patient with severe epistaxis, opposite the anterior extremity of the lower turbinated body, a pedunculated tumor of the size of a cherry-pit. The examination of the tumor revealed a vascular fibroma.

83. DREYFUSS, in the beginning of his elaborate paper, containing a complete bibliography, communicated the history of a case of carcinoma of the nasal cavity observed by himself. In the second part of his paper he gives a brief synopsis of our knowledge of nasal carcinoma, and an especial description of rhinitis carcinomatosa, which he distinguishes from the numerous heretofore described sarcomata. The author discusses the different publications. He collates only 13 cases, among which one observation of his own. He points out the appearance of this affection in the upper portions of the nasal cavity in 7 cases among 13, and the rare occurrence of spontaneous hemorrhages, in contradistinction to the views of the text-books. Another characteristic is the rare infiltration of the adjoining lymph glands. Carcinoma of the nasal fossa does not seem to be associated with general metastases, an important symptom for the differential diagnosis of malignant sarcomata. The pain experienced from the beginning of the affection originated principally from accompanying empyema. Although the prognosis is quite unfavorable, the author advises the operation, at least the removal of a considerable portion of the tumor from the nasal cavity.

GELLÉ.

84. HALBEIS'S paper of 52 pages is very elaborate and to the point; it treats of the pathology and treatment of adenoid vegetations and gives, of course, hardly any noteworthy and novel facts. In conclusion he recommends a modification of Schech's forceps—devised by him, for the removal of the vegetations.

ZARNIKO.

85. ALBESPY describes a case in which, in consequence of adenoid vegetations and hypertrophies of the turbinated bodies,

cerebral symptoms had appeared, consisting of headache, weakened memory, inability for mental labor, occasional asthma and nightmares, and conjunctivitis catarrhalis. After removal of the adenoid tumors and galvano-cautery of the turbinated bodies at several sittings, all pathological phenomena disappeared entirely.

Bok.

86. After general introductory remarks WROBLEWSKI discusses the occurrence of adenoid vegetations in the deaf-mute. He finds them to be of frequent occurrence in them. Whilst in general the frequency of adenoid tumors is from 7 to 7.8 per cent., about 57.5 per cent. of deaf-mutes are affected. The faucial tonsils are also frequently found to be hypertrophied in the deaf-mute (56.5 per cent.). The author therefore advises to examine the deaf-mutes carefully in this respect, and he hopes that their removal will prove very beneficial in some cases.

Bok.

87. LAVRAND reports two cases of relapses in adenoid tumors, one being repeated in one case. In order to avoid such relapses, the removal ought to be made in a very careful manner under narcosis, since remnants do not become atrophied, but may increase.

Bok.

88. The operation of fibromyxomata and fibromata is rendered difficult by the size and hardness; the seat of the tumors making it difficult to place the loop well around. The instruments devised by Goris and Lange are, according to WAGNIER, of no avail. He recommends the following method of operation, which he accidentally discovered. It is possible to reduce the tumor in size by crushing, and to place it with the finger into one nostril, through which it may be readily pulled with the snare, at one or several sittings. He mentions, in addition, a case in which by means of an ordinary metal probe he could tear off the pedicle of the tumor found in front through the anterior nares, whereupon the patient ejected it through the mouth.

Bok.

89. In opposition to Ziem, Bresgen, and others, POSTHUMUS MEYJES asserts that catarrh of the recessus is an affection *sui generis*. The author found in about 30 cases neither complications with suppuration of the nose, nor with that of the accessory cavities. The depression of the recess in the occipital bone, briefly called fovea and bursa pharyngis, was found to be very much marked in 25 among 360 skulls examined by him in the Museum Vrolik at Amsterdam; there were less marked foveæ in 50 skulls, and in 2 cases so large as to allow the introduction of a pea. Because

of the much greater frequency of a recess in the living, the author believes the fovea pharyngis to be present only in isolated cases. In the post-mortems of children the recess is always quite pronounced. He could positively determine with the rhinoscopic mirror, that the muco-purulent, frequently hemorrhagic expectoration arose from the recess. In five cases movable cyst was found which could on strong pressure be penetrated with a probe, whereupon the complaints of pressure and tension in the throat disappeared at once. The treatment of hypersecretion consisted in curetting with the small spoon devised by Kafemann, and subsequent cauterization with nitrate of silver. The treatment conclusively proved the correctness of the diagnosis, although relapses cannot always be prevented. Author's review.

90. GERBER discusses the isolated occurrence of syphilitic affections in the naso-pharynx, without implication of the nose and the lower part of the pharynx, and reports a cured case of his own. The posterior rhinoscopic picture is appended upon a colored plate.

91. LUBET-BARBON briefly describes Tornwaldt's disease. He recommends for treatment the use of the curette, as used by gynecologists. The affected places, particularly the so-called recesses, which may be up to $1\frac{1}{2}$ cm long, are, under the guidance of the mirror, sufficiently curetted and afterwards cauterized with solutions of nitrate of silver. This procedure is followed by inflammation, with profuse discharge and slight pain, which may radiate into the ears and last five or six days. The author has obtained very good results from this method. BOK.

92. CAPART presents a patient with pharyngeal vegetations, which disappeared wellnigh completely by electrolytic treatment, at first by the bipolar, then by the unipolar method. The patient, bore at first 10, then 25 milliampères. SCHIFFERS.

93. MOURE divides the hypertrophic tonsils into three groups :
1. Those which project far beyond the pillars. 2. Those which are completely surrounded by the pillars. 3. So-called pseudo-hypertrophies (collections of cheesy masses or other concretions). With reference to operative treatment, he recommends for the first group the tonsillotome in children and the galvano-cautery loop in older patients, who can keep quiet, on account of avoidance of hemorrhages. For the second group he recommends extensive incisions with galvano-cautery or knife.

The pseudo-hypertrophies should be opened with a blunt or

sharp hook, and the existing pouches obliterated by astringents or galvano-cautery. BOK.

94. At a meeting of the Clinical Society of London, ARBUTHNOT LANE brought forward a case in which he had found it necessary to tie the common carotid on account of very severe and recurrent hemorrhage from the tonsil. In the discussion which followed, it was pointed out that it was usual to tie the external carotid under these circumstances, and that ligature of the common carotid was a very dangerous proceeding. In his reply Lane remarked that in this particular instance he had practically no choice, on account of the manner in which the branches arose from the trunk of the external division of the main artery, and further, that he had never found any evil results arise in tying the common carotid, provided, as in this instance, the precaution were taken to inject a large quantity of salt solution into the veins directly after.

In reference to Lane's case, Mark Hovell suggests that, in some instances at any rate, the inefficiency of the astringents employed in these cases in the first instance is in great measure due to their faulty application, and he recommends that a paste of one part of gallic and three parts of tannic acid with a little water should be firmly rubbed into the bleeding surface with the surgeon's finger, counter pressure being made from the outside with the other hand. Bilton Polard relates a case in which he succeeded in actually ligaturing the two bleeding points and incidentally expresses the opinion that in many instances the digital enucleation of tonsils is both possible and to be preferred to their excision.

URBAN PRITCHARD, London.

Reviews.

Translated by Dr. MAX TOEPLITZ, New York.

I.

Report on the Progress of Otology during the Years 1890 and 1891. By Dr. L. BLAU, Leipzig. Wigand, 1892.

The report gives in 294 pages a brief yet full summary of the papers published during the above-stated period, on scientific and practical otology, and is to be highly recommended to aurists, as well as the preceding report of the years of 1888 and 1889. Moos.

II.

Deaf-Mutism in the Grand-Duchy of Mecklenburg-Schwerin: a Statistico-Otological Study. By Dr. LEMCKE, Lecturer on Otology at Rostock. Leipzig, Lang Kammer, 1892.

This is a detailed report of the main results communicated to and approved at the meeting of German aurists at Frankfort, to the transactions of which we refer the reader. We recommend these exceedingly careful studies to all interested persons, viz., to aurists, practitioners, and also to administrative bodies. Moos.

III.

The Study of the Functions of the Different Parts of the Labyrinth of the Ear. By STANISLAUS VON STEIN, Vol. i. With 125 wood-cuts and 4 phototypes. Moscow, 1892.

This is an historical and critical representation of the physiology of the aural labyrinth up to the present date. I regret to say that this voluminous book, carefully and industriously published, covering 840 printed pages, and also the author's book on the *Literature of the Anatomy and Physiology of the Hearing Organ* (reviewed in a former number of these ARCHIVES), are written in Russian, and therefore will be hardly known and read in Germany. Moos.

IV.

Normal and Pathological Anatomy of the Nose and Its Pneumatic Appendices. By Prof. D. E. ZUCKERKANDL. With 24 lithographic plates. Vol. ii. Vienna and Leipzig, W. Braumüller, 1892.

This volume contains many very valuable additions to the first volume published ten years ago, which was reviewed at that time in these ARCHIVES. In nineteen chapters, illustrated by many clinical histories and excellent pictures, Zuckerkandl treats of the anatomy and fractures of the nasal septum, the etiology of deviations of the septum, rhinitis, habitual epistaxis, the round ulcer of the nasal septum, the inflammatory processes of the mucous membrane of Highmore's antrum, nasal polypi, atrophy of the turbinated bones, syphilis, tuberculous rhinoliths, osteoporosis of the turbinated bones and of the nasal partition, teeth grown into the nasal cavity and dental tumors, dental cysts, empyema, hydrops and polypi of Highmore's antrum, empyema of the ethmoid labyrinth, and finally a report of a tumor-like prominence of the upper cervical vertebræ extending into the pharynx.

The lively interest taken at present in the diseases of the nose and its accessory cavities, also by the aurists, renders this excellent work of the competent author highly welcome to the specialist. We do not enter more fully into the details of the work, and we limit ourselves to a warm recommendation of the book beautifully gotten up, from the contents of which even readers with large experience may derive many suggestions and instructions.

Moos.

V.

Baratoux. Guide Pratique pour l'Examen des Maladies du Larynx, du Nez, et des Oreilles. (Practical Guide to the Examination of the Diseases of the Larynx, Nose, and Ears.) Part viii., 334 pages, with 181 engravings in the text and an atlas of 186 pictures.

This work gives a concise introduction to the physical examination and treatment of the organs enumerated in the heading, and also the etiology, symptoms, diagnosis, and prognosis of these affections. The hearing organ is dealt with in a brief and concise manner; the French and foreign literatures are carefully considered. The numerous illustrations are excellently executed.

Moos.

VI.

Anatomical Examination of the Paths of the Blood-Current in the Labyrinth of the Human Ear. By O. EICHLER. With 4 plates and 3 wood-cuts. Leipzig, 1892. Reviewed by F. SIEBENMANN, Bâle.

The endosteum of the cochlea and the organic substance of the closely adjoining osseous layer prove in corrosion to be of much resistance, but Eichler succeeded in the isolation of Steinbrügge-Barth's celloidin casts of the cochlea¹ in connection with this covering fundamental membrane. In this way the author made a step forward, by injecting the vessels of the inner ear beforehand from the carotis communis and from the arteria basilaris, and finally thus obtained specimens, which, inferring from the beautifully colored illustrations and from the careful description, give heretofore unattained explanations of the vascularization of the cochlea. The advantages of a non-dissected, injected specimen over a series of sections have been apparent from the reviewer's specimens of the labyrinth made with Wood's metal (cf. *Corrosion Anatomy*, Fig. 10), and this will be all the more the case if the parts to be examined are transparent in addition.

With reference to the fuller details of the technique, we refer you to the original. Eichler succeeded in filling the arteries wellnigh completely, but the veins less completely, so as to be compelled to supplement their study by means of metal corrosions. (The difficulty mentioned by Eichler of filling the veins from the jugular or from the sinus is confirmed by the reviewer from his own repeated experience.)

According to Eichler's description of his injected casts the extremely tortuous *arteria auditiva* passes undivided through the meatus and the tractus foraminulentus; it divides at the level of the first half cochlear turn into the vestibular and the cochlear branches. The former runs to the sacculus utriculus and the semicircular canals; the latter, however, follows spirally the turns of the cochlea, being attached to "the root of the vestibular, intermediary wall." Its extremity becomes bundle-like at the cupola. The cochlear artery supplies the spiral lamina and the walls of the vestibular scala, which arrangements corre-

¹ Transactions of the "Physiolog. Gesellschaft" at Berlin, 1888-'89, reviewed in the *Zeitschr. f. Ohrenheilk.*, vol. xix., p. 347, and *Med. Centralbl.*, 1889, p. 545.

spond with Schwalbe's description. In accordance with the formerly (*l. c.*) published, here not considered, results of examination of the *reviewer*, Eichler found, "that the glomeruli arteriosi of the cochlea described by Schwalbe, could not be demonstrated in man." We shall enter further below into the descriptions of the smaller branches of the artery.

If we follow the course of the cochlear vein according to Eichler's description, from the cochlear base toward the apex, we find it divided at the lowest half turn into two large branches. One branch continues as vena spiralis modioli (Schwalbe) and ends, as has been described by the *reviewer* (*l. c.*) toward the basal turn; the other ascends directly, curving off abruptly, into the middle turn, in order to take thence as vena spiralis the flat spiral course of the tympanal scala in the modiolus. The main trunk receives, near the apertura interna aquæductoris cochleæ, additional branches from the vestibule, and anastomoses in the manner mentioned by the *reviewer* (*l. c.*) with the veins of the vestibular aqueduct.

With reference to the capillaries, Eichler arrives at the conclusion that Schwalbe's description is justified, inasmuch as the afflux of the cochlear circulation takes place through the scala vestibuli, the efflux through the scala tympani; that, however, arterial as well as venous nets spread in either scala. The author mentions the following three main capillary provinces as separate and independent of each other: those of the modiolus, of the lamina spiralis ossea, and of the walls of the scalæ. The latter presents somewhat complicated relations, inasmuch as here four subdivisions should be distinguished, having this in common that they form connections neither with vessels of the basilar membrane nor with those of the surrounding bone; among these four small capillary nets of the walls of the scalæ, two run in the tympanal or in the vestibular portion of the spiral ligament respectively, another upon the tympanal, and the fourth upon the vestibular, surface of the intermediary wall. There exists no vas spirale of the basilar membrane or of the crista.

There are no descriptions of the course of veins and arteries in the semicircular canals, neither in the text nor in the illustrations.

This brief extract may suffice to excite the reader to the study of the original, and to control the results by preparing such specimens. The *reviewer* hopes to resume this paper at a future occasion.

VII.

Handbuch der Ohrenheilkunde, written by a number of representative aurists ; edited by H. SCHWARTZE.

The first volume of this cyclopedia of otology has just appeared, and contains, in fifteen chapters, what may be called general otology ; macroscopic anatomy of the ear, by Zuckerkandl, histology by Kessel and Steinbrügge, . . . pathological anatomy by Habermann, circulation and nutrition by Bezold, etiology by Moos, therapeutics by Wagenhäuser. It gives an immense amount of information written by authoritative pens.

The second volume will contain special otology ; the operations on the ear to be described by Schwartz.

This exhaustive work needs no special recommendation ; it will be indispensable to every thorough aural surgeon. H. K.

VIII.

The Mastoid Operation. By SAMUEL ELLSWORTH ALLEN. pp. 111. Robert Clarke & Co., Cincinnati, 1892.

This little volume cannot fail to interest all who have devoted attention to this branch of special surgery.

The history of operative procedures upon the mastoid process is written in such a way that the reader is able to trace without difficulty the successive advances made in the operation, from the crude efforts of Petit and Jasser to the perfected procedure of the present day.

The chapter dealing with the anatomy of the parts is clear and concise, the points bearing upon the operation being brought forward prominently, while a detailed description of those portions of the temporal bone, not immediately concerned, is wisely omitted.

In considering the pathological conditions which necessitate the performance of the operation, we are particularly impressed with the clear statement of the various views held as to the true nature of cholesteatoma. In no other work, as far as we know, have the various theories as to the causation of this obscure condition been so well stated. The author does not commit himself to any one view, but emphasizes the necessity of the thorough removal of every vestige of the mass. Special attention is called to the condensing osteitis caused by these epithelial aggregations, resulting in a partial or complete sclerosis of the mastoid.

The directions for the operative technique are simple and easily understood. The great value of thoroughly clearing the passage between the antrum and tympanum of all granulation tissue and softened bone is recognized, and special stress is laid upon this point. If pus is not found in the antrum, the author advises an exploration of the cells at the apex; it has been our usual practice to do this in every case, as pus may be retained here, even if a collection in the antrum has been evacuated.

With reference to after-treatment, it has been our experience that, when the mastoid has been opened, and free communication with the middle ear established, there has seldom been any discharge from the meatus; the ear itself needing almost no attention. We have also rarely found it necessary to dress the wound daily at any period after the operation.

The directions for the performance of Stacke's operation are explicit, and the advantages of the procedure on the treatment of cholesteatoma are favorably impressed upon the reader.

The author is to be congratulated on the attractive manner in which he has presented the subject, the work being very concise, and this without the omission of any important details.

The plates and cuts are original and add greatly to the value of the brochure.

E. B. D.

MISCELLANEOUS NOTES.

A.—BRITISH.

SOCIETY MEETINGS.

BRITISH MEDICAL ASSOCIATION—East Anglian Branch.—At the meeting held at Sherringham on September 8, 1892, Professor Victor Horsley gave an address upon The Dangers and Consequences of Prolonged Otitis Media, with Special Reference to Cerebral Abscess. The interest of the address was much enhanced by the exhibition of a beautiful series of photographs from macroscopic and microscopic specimens, shown by means of the lantern.

BRITISH LARYNGOLOGICAL AND RHINOLOGICAL ASSOCIATION.—At a recent meeting, Mr. B. Hewetson, of Leeds, read a paper on The Relation between Various Forms of Nasal Stenosis and Deafness. Mr. Hewetson advocates his well-known plan of forcibly dilating the nares in these cases, and for this purpose he employs an instrument very much like the ordinary glove stretcher.

NORTHUMBERLAND AND DURHAM MEDICAL SOCIETY.—At the October meeting of this society Dr. Robertson exhibited a case of mastoid disease, showing recent methods of operating.

MIDLAND MEDICAL SOCIETY.—At the meeting of this society held on October 19, 1892, Mr. Heaton showed an aural polypus which he had removed by means of the galvano-cautery from a patient aged sixty, in whose ear it had been growing for the last eighteen years. The special interest in the case lay in the great size of the tumor.

HARVEIAN SOCIETY OF LONDON.—Mr. G. P. Field is to be congratulated upon being selected to deliver the special course of

Harveian lectures before this society on December 1, 8, and 15, 1892. Mr. Field chose for his subject The Pathology and Treatment of Suppurative Diseases of the Ear.

MEDICAL SOCIETY OF VICTORIA.—At the meeting at Melbourne on July 4, 1892, Dr. Barrett read a paper on a case of Chronic Suppuration of the Middle Ear; Petrous Necrosis; Meningitis; Death. The patient was a male aged twenty-four. The discharge from the ear had existed from childhood; acute head symptoms were of eight weeks' duration. Dr. Barrett gouged away the mastoid freely, opening it into the external meatus, but the patient died in a few days. At the post mortem general suppurative meningitis extending along the sheath of the auditory nerve, was discovered.

It had been decided to hold the next International Otological Congress at Florence; bearing in mind, however, that the International Medical Congress is to meet at Rome in the last week of September, 1893, it does not seem unnatural that proposals should be made to transfer the Otological Congress to this latter city. Whatever may be the final decision upon this point, the next Otological Congress will probably receive an invitation to hold the ensuing Congress (1897) in London.

B.—AMERICAN.

SOCIETY MEETINGS.

Before the N. Y. ACADEMY OF MEDICINE on Oct. 6, 1892, Dr. H. Knapp read a paper on *Otitic Brain Disease: Its Varieties, Diagnosis, Prognosis, and Treatment*, with illustrative cases from his own practice. He spoke of the transition of otitic meningeal irritation into meningeal inflammation, laid stress on the recognition of those forms of ear disease that are most apt to produce brain trouble, viz., attic disease, and mastoiditis perforating on the medial side. Among the cases reported may be specially mentioned one with a double brain abscess and sinus thrombosis, fatal, autopsy; one with thrombosis of cerebral sinuses and the internal jugular vein, cured by an extensive operation on the mastoid. Two cases of extradural abscess with perforation of the occipital bone, the first fatal, with autopsy; the second cured after opening of the mastoid. The substance of the paper will be published in these ARCHIVES.

THE NEW YORK OTOLOGICAL SOCIETY held its regular meeting at the office of Dr. John L. Adams, No. 17 West 45th Street, on Tuesday, Nov. 22d, at 8 P.M.

Dr. H. A. Alderton presented a patient upon whom he had operated successfully for an extensive caries of the mastoid.

Dr. J. E. Sheppard exhibited a temporal bone removed from a patient who had died from a cerebellar abscess, resulting from caries of the mastoid. The mastoid had been operated upon as soon as symptoms indicative of its involvement presented.

Dr. Dench presented the malleus, incus, and stapes removed from a patient suffering from chronic purulent otitis, with caries of the malleus and incus. The stapes had been removed in the hope of improving the hearing, and the result had been satisfactory.

Dr. James Hewitt presented an incus hook of original design ; also an improved middle-ear syringe.

Dr. Dench presented a head-and-shoulder rest, for supporting patients in the semi-recumbent position during operations upon the middle ear.

Dr. Bacon reported a case of mastoiditis, following the auto-insufflation of salt water into the nostrils, for the relief of nasal stenosis.

Dr. Pomeroy reported two cases of atresia of the external auditory meatus, one of congenital, the other of traumatic origin. Both were operated upon, and in one a satisfactory result was obtained. The operator advocated the use of the soft rubber drainage tube in these cases, introduced in such a way as to exert a continuous dilating force by its own elasticity.

Dr. Toeplitz reported a case of otitis interna of specific origin. The aural symptoms in this case appeared at the same time as the cutaneous roseola.

The following officers were elected for the ensuing year : President, Dr. Albert H. Buck ; Vice-President, Dr. Emil Gruening ; Secretary, Dr. E. B. Dench.

At the meeting of the SECTION ON LARYNGOLOGY OF THE NEW YORK ACADEMY OF MEDICINE, held November 23, 1892, Dr. W. Freudenthal read a paper on *Asepsis or Antisepsis in Nasal Surgery?* He favors careful asepsis. In the discussion which followed, Drs. M. J. Asch, S. Myles, C. C. Rice, H. H. Curtis, Jon. Wright, and Wendell C. Phillips took part.

At the same meeting Dr. J. E. Newcomb read a paper on *The Question of Hemorrhage after Operations for Adenoid Growths, with Report of a Fatal Case*. This case was a child of three and a half years with anæmia and catarrhal bronchitis. Three hours after operation hemorrhage began and continued all night, but the parents did not summon a physician until 6 A.M. the next morning, when the child was too much exhausted and died. (Dr. Newcomb favors operating with the head thrown backwards, and we think that this position is more likely to tend to a lesion of any larger blood-vessel than when the patient sits erect.—W. F.) Dr. S. O. Vander Poel then reported a case of hemorrhage after removing adenoid vegetations, where recovery followed by tamponing. Drs. Jon. Wright, H. H. Curtis, and S. Myles expressed their experiences in like cases.

The next meeting of the AMERICAN MEDICAL ASSOCIATION will be at Milwaukee from June 6th-9th, during the progress of the Columbian exposition at Chicago. SECTION OF LARYNGOLOGY AND OTOTOLOGY: President, E. L. Shurby, Detroit; Secretary, J. E. Boylan, Cincinnati.

NEW INSTITUTIONS.

THE NEW YORK THROAT AND NOSE DISPENSARY opened in March, 1892, at 833 Third Avenue, New York. The hours of attendance are from 2-3 P.M. and 7:30-8:30 P.M. daily.

The staff is as follows: SURGEONS: Edward J. Bermingham, M.D., Nathan S. Roberts, M.D., Max Toeplitz, M.D. ASSISTANTS: W. P. Broderick, M.D., Samuel Goldstein, M.D., G. B. McAuliffe, M.D.

A night dispensary for the treatment of diseases of the EYE, EAR, NOSE, AND THROAT has been instituted at ST. BARTHOLOMEW'S PARISH HOUSE, New York, No. 209 East 42d Street. Dr. John L. Adams and Dr. Fred. Whiting are the surgeons in attendance.

APPOINTMENTS.

Dr. ALBERT H. BUCK has been appointed Consulting Otologist to the Presbyterian Hospital, New York.

Dr. EDWARD B. DENCH has been appointed Professor of Otology at the New York Polyclinic.

Dr. WALTER VULPIUS, formerly Assistant of Dr. Stacke in Erfurt, Germany, has been appointed Assistant Surgeon to the Aural Department of the N. Y. Ophthalmic and Aural Institute.

Dr. MAX THORNER has been appointed Professor of Laryngology and Otology at the Cincinnati College of Medicine and Surgery.

Dr. L. KATZ has been admitted to the Medical Faculty of the University of Berlin as lecturer (Privatdocent) on Otology.

Obituary.

By the death of Mr. EDWARD COCK London surgery has lost one of the few remaining links connecting it with the past. He died at Kingston at the ripe old age of eighty-five. Few probably are aware that, as far back as 1834, he communicated to the London Medico-Chirurgical Society a paper "On Malformation of the Internal Ear, being the Result of Post-Mortem Investigations Performed in Five Cases of Congenital Deafness."

The greater part of Mr. Cock's work was done in connection with Guy's Hospital, of which institution he was consulting surgeon for the last twenty-one years.

Fig. 1.

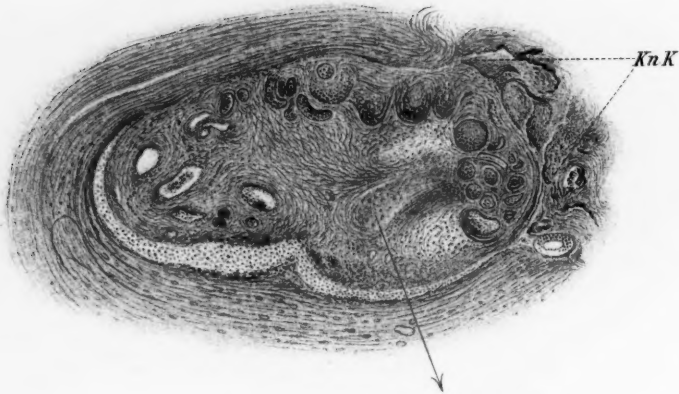


Fig. 2.

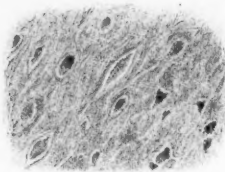


Fig. 3.

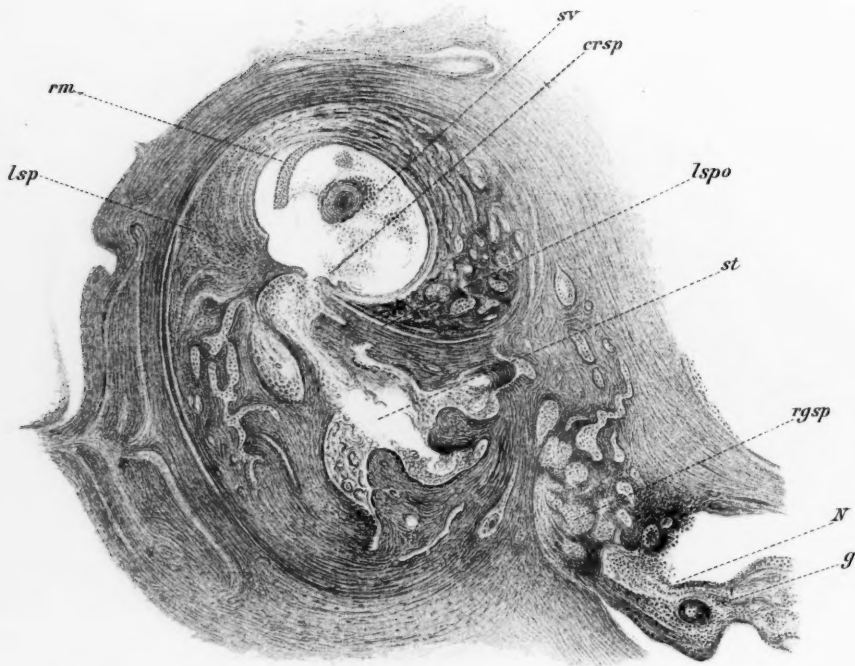


Fig. 5.

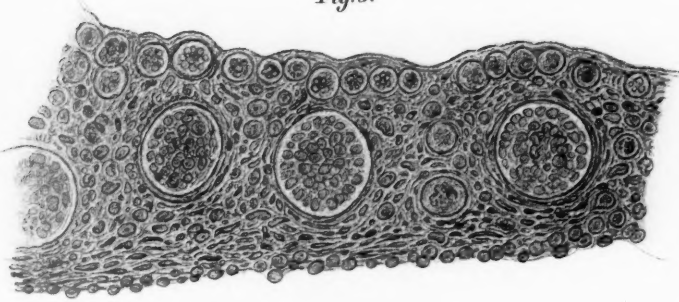


Fig. 6.

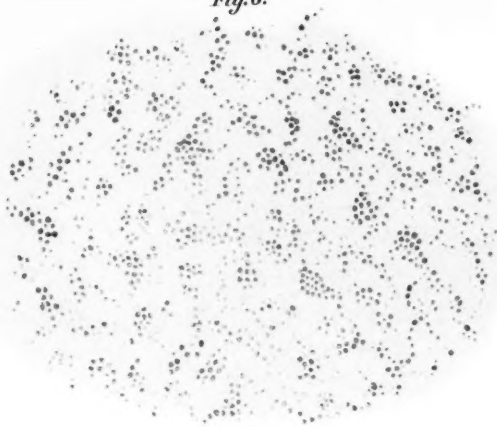
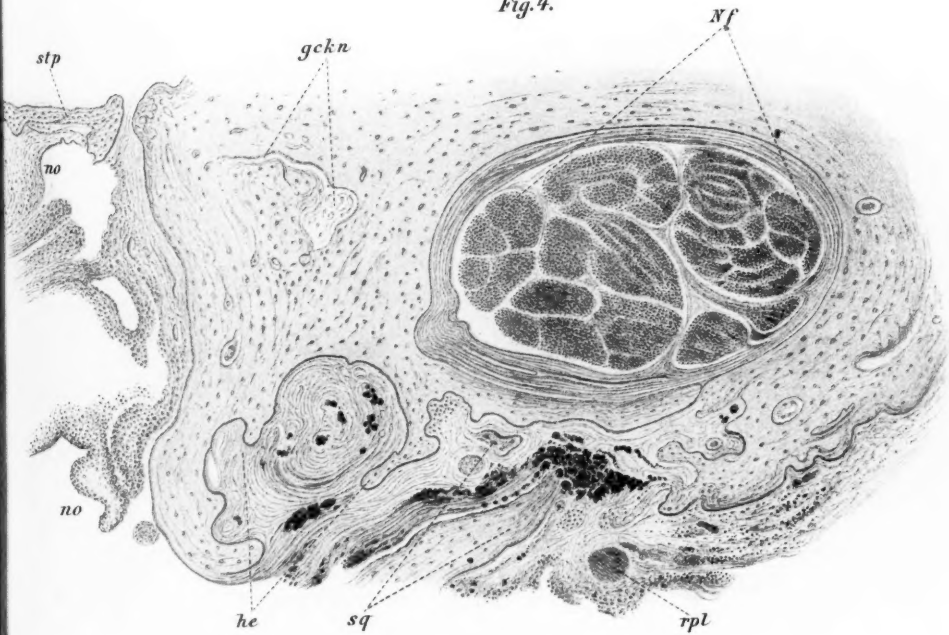


Fig. 4.



Lith. Anst. v. C. Kirst, Leipzig.

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NOTICE TO CONTRIBUTORS.

The editors and publishers of the ARCHIVES beg to offer some suggestions to authors who propose to favor them with their contributions.

1. As original communications the ARCHIVES can accept only such papers as have never been printed nor are intended to be printed in other journals. If a preliminary communication on the subject of a paper has been published, the author is requested to state this in the letter accompanying his manuscript. It is understood that contributors to these ARCHIVES and editors of other periodicals will make no abstracts of the original papers published in this journal without giving it due credit for the same.

2. Authors will receive gratuitously twenty-five reprints of their articles. If a greater number is desired,—notice of which should be given at the head of the manuscript,—only the additional cost of presswork and paper will be charged to the author.

3. In preparing manuscript for the compositor it is requested that the following rules be adhered to:

a. Write on one side of the paper only.

b. Write without breaks, *i. e.* do not begin a new sentence on a new line. When you want to begin a new line or paragraph at a given word, place before it in your MS. the sign ¶.

c. Draw a line along the margin of such paragraphs as should be printed in smaller type—for instance, all that is clinical history in reports of cases, etc.

d. Words to be printed in *italics*, should be underscored once, in SMALL CAPITALS twice, in LARGE CAPITALS three times.

4. Authors may receive proofs for revision if they will kindly return them without delay. We beg however to remind our contributors that changes in the copy are equivalent to resetting, causing so much additional expense. We therefore request them, to make, if possible, no alterations at all in their MSS., or, at least, to limit these to what is of essential importance.